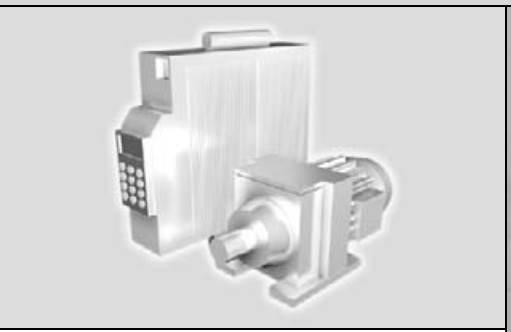
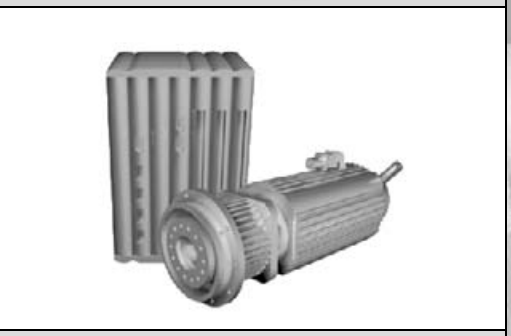
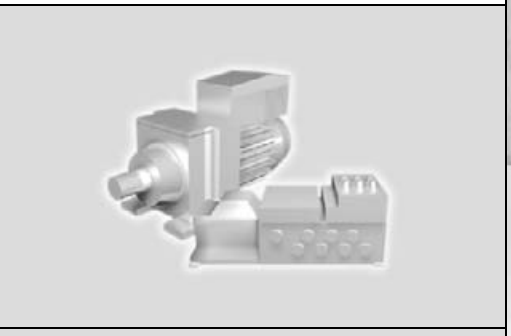
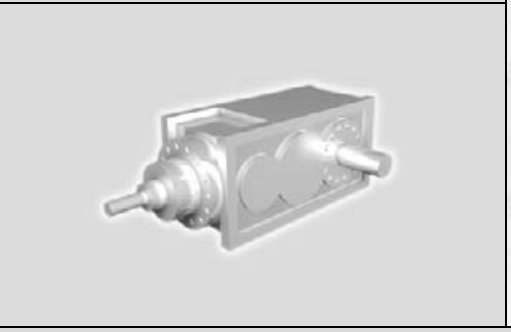
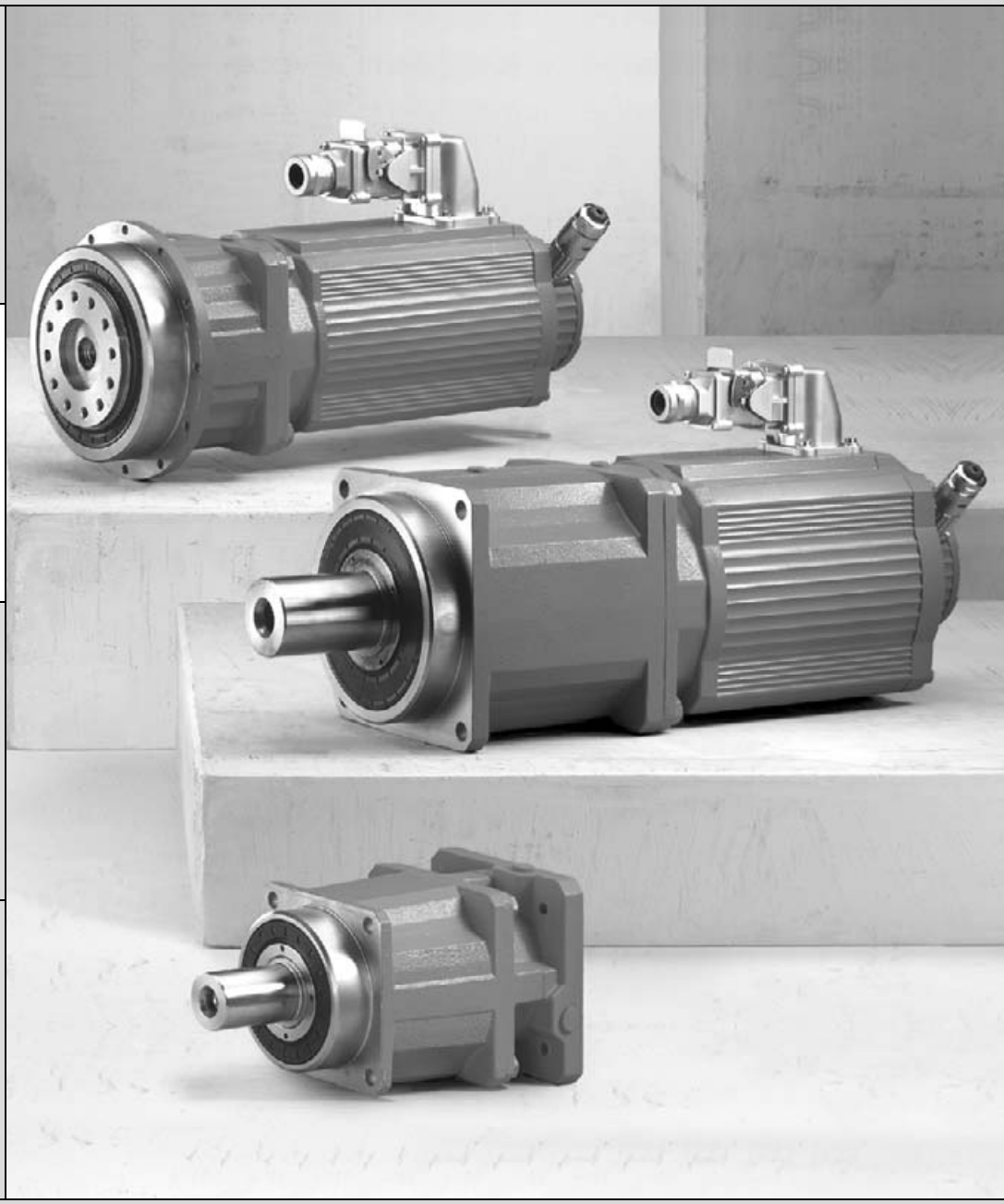
SEW EURODRIVE











PSF.. Planetary Servo Gear Units

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Operating Instructions

SEW
EURODRIVE

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1 Important Information about the Operating Instructions

1.1 Important notes and designated use

1.1.1 Integral part of the product

The operating instructions are part of the PSF.. planetary servo gear units and contain important information for operation and service. The operating instructions are written for assembly, installation, startup and service employees who are involved in the installation and maintenance of PSF.. planetary servo gear units.

1.1.2 Designated use

The designated use refers to the procedure specified in the operating instructions.

The PSF.. planetary servo gear units are units run by motors for industrial and commercial systems. Implementing gear unit loads other than the permitted values, or operating PSF.. planetary servo gear units in areas of application other than industrial and commercial systems, is only permitted after consultation with SEW-EURODRIVE.

In compliance with the EC Machinery Directive 98/37/EC, the PSF.. planetary servo gear units are components for installation in machinery and systems. In the scope of the EC directive, you must not take the machinery into operation in the designated fashion until you have established that the end product complies with the Machinery Directive 98/37/EC.

1.1.3 Qualified personnel

PSF.. planetary servo gear units represent a potential hazard for persons and material. Consequently, assembly, installation, startup and service work may only be performed by trained personnel who are aware of the potential hazards.

The personnel must be appropriately qualified for the task in hand and must be familiar with the assembly, installation, startup and operation of the product. The personnel must read the operating instructions, in particular the safety notes section, carefully and ensure that they understand and comply with them.

1.1.4 Liability for defects

Incorrect handling or any action performed that is not specified in these operating instructions could impair the properties of the product. In this case, you lose any right to claim under limited warranty against SEW-EURODRIVE GmbH & Co KG.

1.1.5 Product names and trademarks

The brands and product names contained within these operating instructions are trademarks or registered trademarks of the titleholders.

1.2 Waste disposal

Please follow the current national regulations.

Dispose of the following materials separately in accordance with the country-specific regulations in force, as:

- Steel scrap
  - Housing parts
  - Gears
  - Shafts
  - Rolling element bearing
  - Cast parts
- Aluminum scrap
  - Housing parts
  - Adapter parts
- Collect waste oil and dispose of it according to the regulations in force.

1.3 Explanation of symbols

Safety and warning instructions

Always follow the safety and warning notes in this documentation.

Electrical hazard
Possible consequences: Severe or fatal injuries.

Hazard
Possible consequences: Severe or fatal injuries.

Hazardous situation
Possible consequences: Slight or minor injuries.

Harmful situation
Possible consequences: Damage to the unit and the environment.

Tips and useful information.

A requirement of fault-free operation and fulfillment of any rights to claim under guarantee is that you adhere to the information in the **operating instructions**. **Read the operating instructions** before you start operating the unit!

The **operating instructions** contain **important information about servicing**. Therefore, keep the operating instructions **close to the unit**.

2 Safety Notes

2.1 Preliminary information

The following safety notes are primarily concerned with the use of gear units.

If using **gearmotors**, please also refer to the safety notes for motors in the corresponding operating instructions.

Please also observe the supplementary safety notes in the individual sections of this manual.

Burns hazard!

Touching the gear unit when it has not been cooled will result in burns. The gear unit can have a surface temperature of up to 110 °C.

Never touch the gear unit during operation or in the cool down phase once the unit has been switched off.

2.2 General information

Never install damaged products or take them into operation.

Submit a complaint to the shipping company immediately in the event of damage.

During or after operation, gearmotors, gear units and motors have:

- Live parts
- Moving parts
- Hot surfaces (may be the case)

Only qualified personnel may carry out the following work:

- Installation/assembly
- Connection
- Startup
- Maintenance
- Servicing

The following information and documents must be observed during these processes:

- Relevant operating instructions and wiring diagrams
- Warning and safety signs on the gear unit/gearmotor
- System-specific regulations and requirements
- National/regional regulations governing safety and the prevention of accidents

Serious injuries and property damage may result from:

- Improper use
- Incorrect installation or operation
- Unauthorized removal of necessary protection covers or housing

2.3 Transport / Putting into storage

Inspect the shipment for any damage that may have occurred in transit as soon as you receive the delivery. Inform the shipping company immediately. Do not operate the gear unit if it is damaged.

The screwed in transport eyebolts are only designed for the weight of the gearmotor / gear unit. Do not attach any additional loads.

If the gearmotor has two suspension eye lugs or lifting eyebolts, then you should also use both suspension eye lugs for attaching transport ropes. In this case, the tension force vector of the slings must not exceed a 45° angle in accordance with DIN 580.

Use suitable, sufficiently rated handling equipment if necessary. Remove securing devices used for transportation prior to startup.

STOP

Possible damage caused by incorrect storage!

Store the gear unit in a dry, dust-free room if it is not to be installed straight away.

2.4 Installation / assembly

Adhere to the instructions in section 4, "Mechanical Installation."

2.5 Startup / operation

Ensure that the following requirements have been met before startup:

- Monitoring and protection devices may not be deactivated. This requirement also applies to the test run.
- Do **not** operate the gear units under the following ambient conditions:
  - Potentially-explosive atmosphere
  - Oils
  - Acids
  - Gases
  - Vapors
  - Radiation
- The ambient temperature must be between -20 °C and +40 °C according to the lubricant table in section 8, "Lubricants." It is essential that you contact SEW-EURODRIVE if ambient temperatures exceed this range.
- Only operate the gear units when there is sufficient ventilation to prevent heat build-up.

Also refer to the information in Sec. 5, "Startup."

2.6 Inspection/maintenance

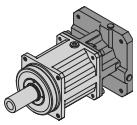
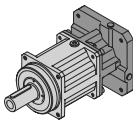
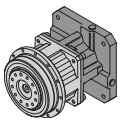
Comply with the instructions in section 6, "Inspection and Maintenance."

3 Delivery Scope and Unit Design

For scope of delivery and project planning, refer to the "Low Backlash Geared Servomotors (BSF.., PSF..)" catalog and the operating instructions for the motor used to drive the gear unit.

The operating instructions for PSF.. planetary servo gear units are available for download from the Internet at the following address: "www.sew-eurodrive.de."

3.1 Types and options

PSF.. planetary servo gear units with B5 output flange		
Type		**Meaning**
	PSF..	Planetary servo gear units with solid shaft
	PSKF..	Planetary servo gear units with solid shaft and key
	PSBF..	Planetary servo gear units with flange block shaft to EN ISO 9409
Options for PSF.. planetary servo gear units /PSKF.. /PSBF..		
Type		**Meaning**
	PSF.. /R	Option for reduced circumferential backlash. This **option applies to all types** of the planetary servo gear units.
	PSF../M	Option for minimized circumferential backlash. This **option applies to all types** of the planetary servo gear units.

3.2 Unit designation and nameplate

3.2.1 Example: Order code for PSF.. planetary servo gear units with EPH.. adapter

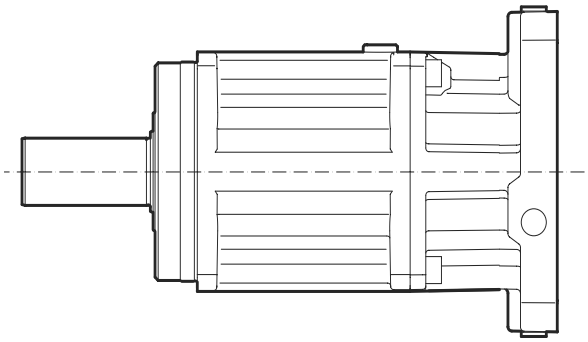


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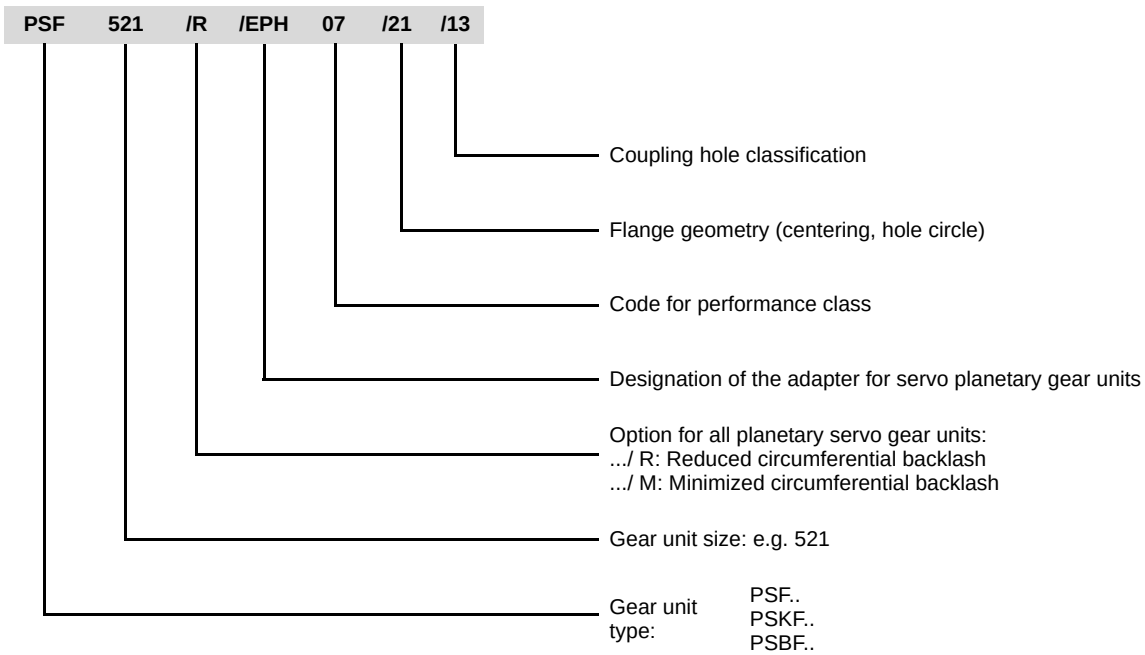
Figure 1: Example for a PSF.. planetary servo gear unit with EPH adapter

The unit designation of the PSF.. planetary servo gear unit with adapter begins with the series of the gear unit. For example, a planetary servo gear unit with adapter has the following unit designation:


PSF 521 /R /EPH 07 /21 /13
Coupling hole classification
Flange geometry (centering, hole circle)
Code for performance class
Designation of the adapter for servo planetary gear units
Option for all planetary servo gear units:
.../ R: Reduced circumferential backlash
.../ M: Minimized circumferential backlash
Gear unit size: e.g. 521
Gear unit type:
PSF..
PSKF..
PSBF..

Example: Nameplate for PSF.. planetary servo gear units with adapter

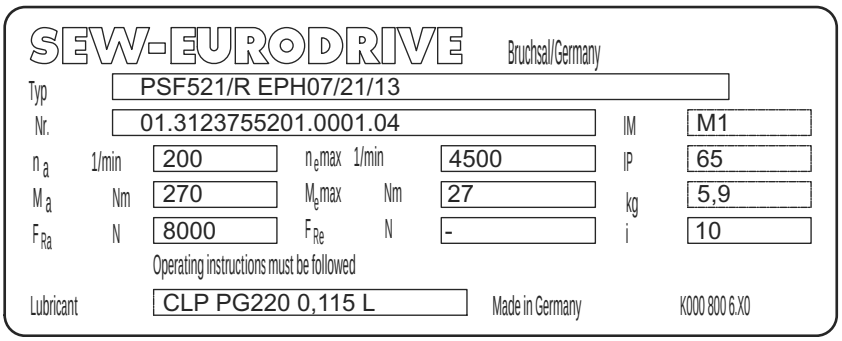


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Figure 2: Sample nameplate

F_{Ramax}	[N]	= Maximum overhung load on the output side
F_{Remax}	[N]	= Maximum overhung load on the input side
i		= Gear unit reduction ratio
IM		= Mounting position
IP..		= Enclosure
n_{emax}	[1/min]	= maximum input speed
n_a	[1/min]	= output speed
M_{emax}	[Nm]	= maximum input torque
M_a	[Nm]	= output torque

3.2.2 Example: Order code for PSF.. planetary servo gear units

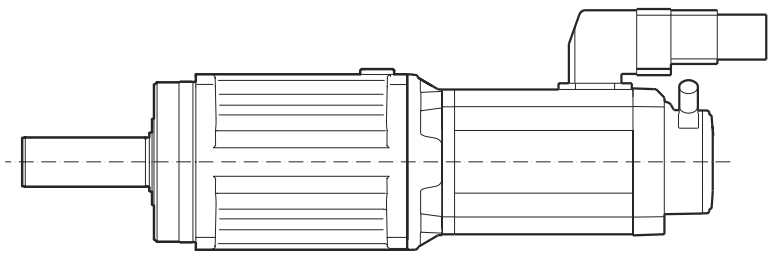

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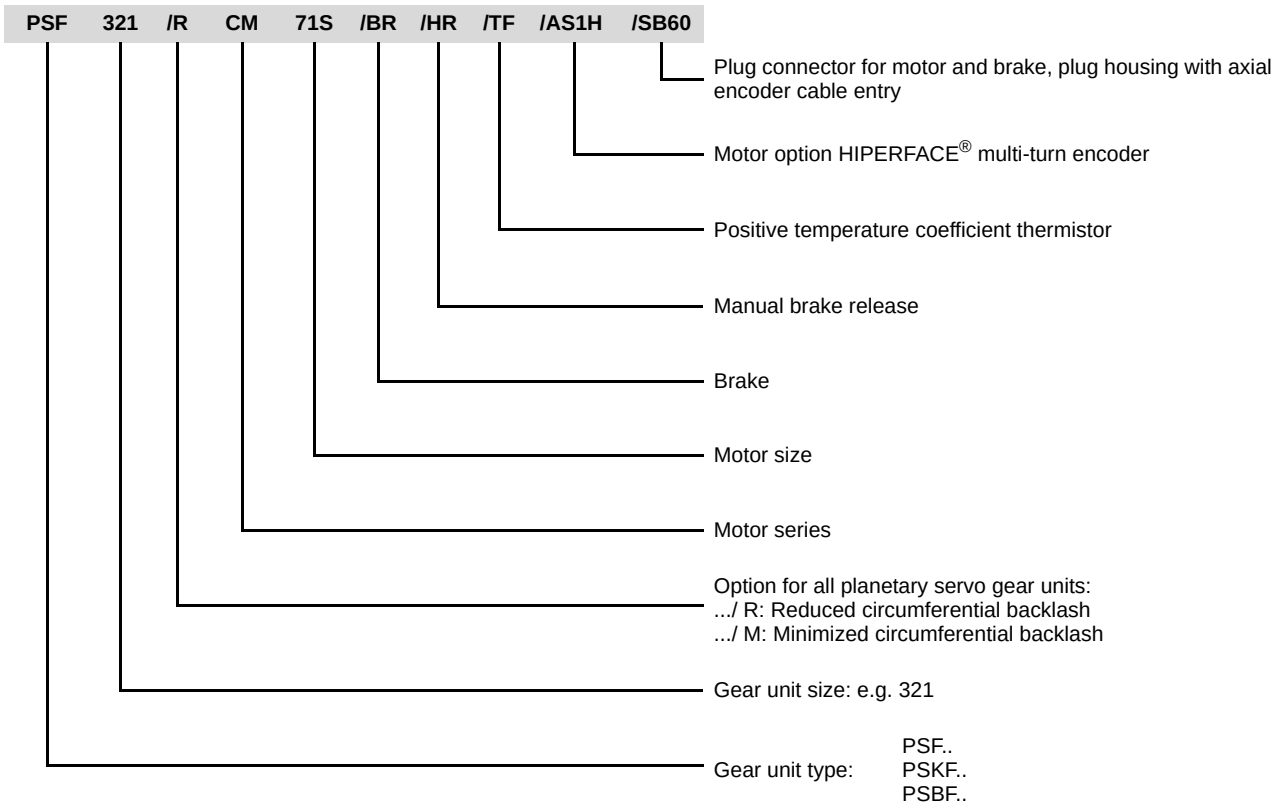
Figure 3: Example of a PSF.. planetary servo gearmotor

A planetary servo gearmotor with brake, manual brake, positive temperature coefficient thermistor and plug connector with a connection cross section of 1.5 mm^2 has, for example, the following unit designation:


PSF 321 /R CM 71S /BR /HR /TF /AS1H /SB60
Plug connector for motor and brake, plug housing with axial encoder cable entry
Motor option HIPERFACE® multi-turn encoder
Positive temperature coefficient thermistor
Manual brake release
Brake
Motor size
Motor series
Option for all planetary servo gear units:
.../ R: Reduced circumferential backlash
.../ M: Minimized circumferential backlash
Gear unit size: e.g. 321
Gear unit type:
PSF..
PSKF..
PSBF..

Example: Nameplate for a PSF.. planetary servo gearmotor

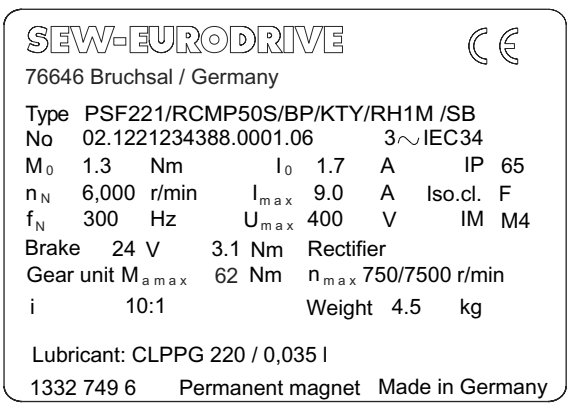

SEW-EURODRIVE
76646 Bruchsal / Germany
Type PSF221/RCMP50S/BP/KTY/RH1M /SB
No 02.1221234388.0001.06 3~ IEC34
M0 1.3 Nm I0 1.7 A IP 65
nN 6,000 r/min Imax 9.0 A Iso.cl. F
fN 300 Hz Umax 400 V IM M4
Brake 24 V 3.1 Nm Rectifier
Gear unit Mamax 62 Nm nmax 750/7500 r/min
i 10:1 Weight 4.5 kg
Lubricant: CLPPG 220 / 0,035 l
1332 749 6 Permanent magnet Made in Germany

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Figure 4: Nameplate of a PSF.. planetary servo gearmotor

The nameplate of the PSF.. planetary servo gearmotor is fixed to the servomotor.

3.3 Gear unit design

The following illustrations are intended to explain the general structure. Their purpose is only to make it easier to assign components to the spare parts lists. Discrepancies may occur depending on the gear unit size and version!

3.3.1 Basic design of a single-stage planetary servo gear unit

PSF121 / PSKF121 to PSF621 / PSKF621

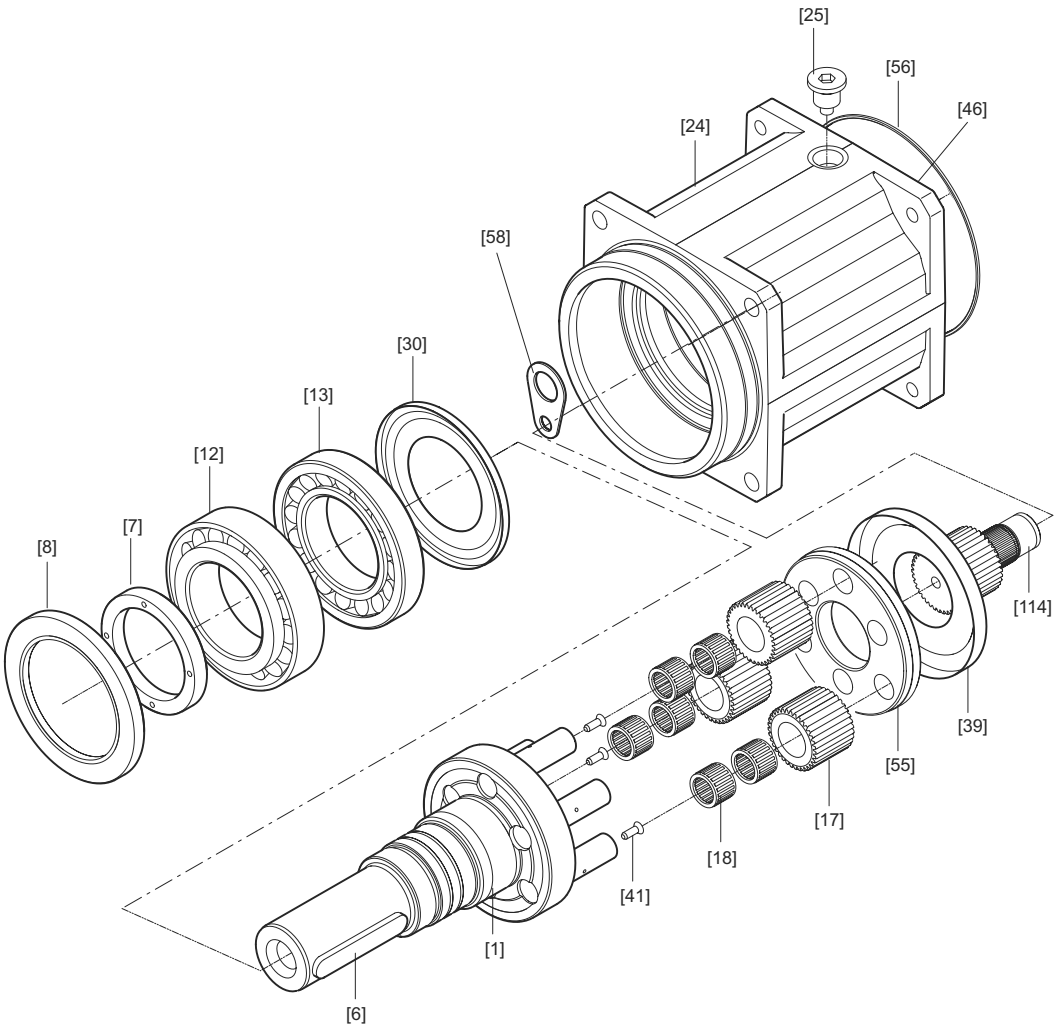

Figure 5: Basic design of planetary servo gear units PSF121 / PSKF121 to PSF621 / PSKF621

[1]	Planet carrier for output, complete	[17]	Planet wheel	[41]	Countersunk pin
[6]	Key[1)]	[18]	Needle roller	[46]	Adh. and sealing compound
[7]	Shaft nut	[24]	Housing	[56]	O-ring
[8]	Oil seal	[25]	Screw plug	[58]	Eyebolt[2)]
[12]	Tapered roller bearing	[30]	Nilos ring[3)]	[114]	Sun wheel
[13]	Tapered roller bearing	[39]	Safety disk		

1) Only for PSKF121 to PSKF621
2) Only for PSF621 and PSKF621
3) Only for mounting position M2

3.3.2 Basic design of a single-stage planetary servo gear unit

PSF721 / PSKF721 to PSF921 / PSKF921

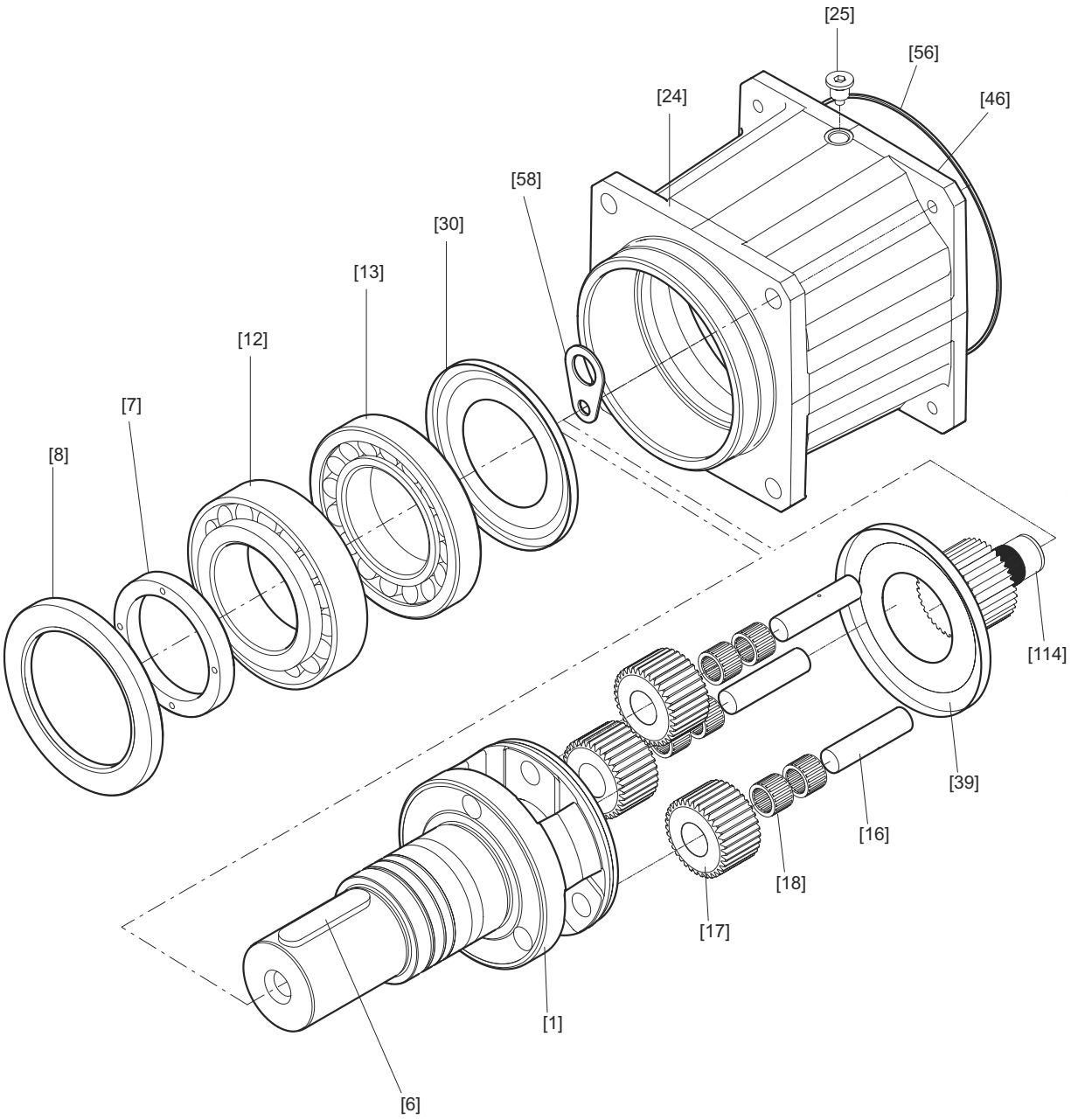

Figure 6: Basic design of planetary servo gear units PSF721 / PSKF721 to PSF921 / PSKF921

[1]	Planet carrier for output	[16]	Planetary gear axle	[39]	Safety disk
[6]	Key[1)]	[17]	Planet wheel	[46]	Adh. and sealing compound
[7]	Shaft nut	[18]	Needle roller	[56]	O-ring
[8]	Oil seal	[24]	Housing	[58]	Eyebolt
[12]	Tapered roller bearing	[25]	Screw plug	[114]	Sun wheel
[13]	Tapered roller bearing	[30]	Nilos ring[2)]		

1) Only for PSKF721 to PSKF921

2) Only for mounting position M2

3.3.3 Basic design of a two-stage planetary servo gear unit

PSF122 / PSKF122 to PSF622 / PSKF622

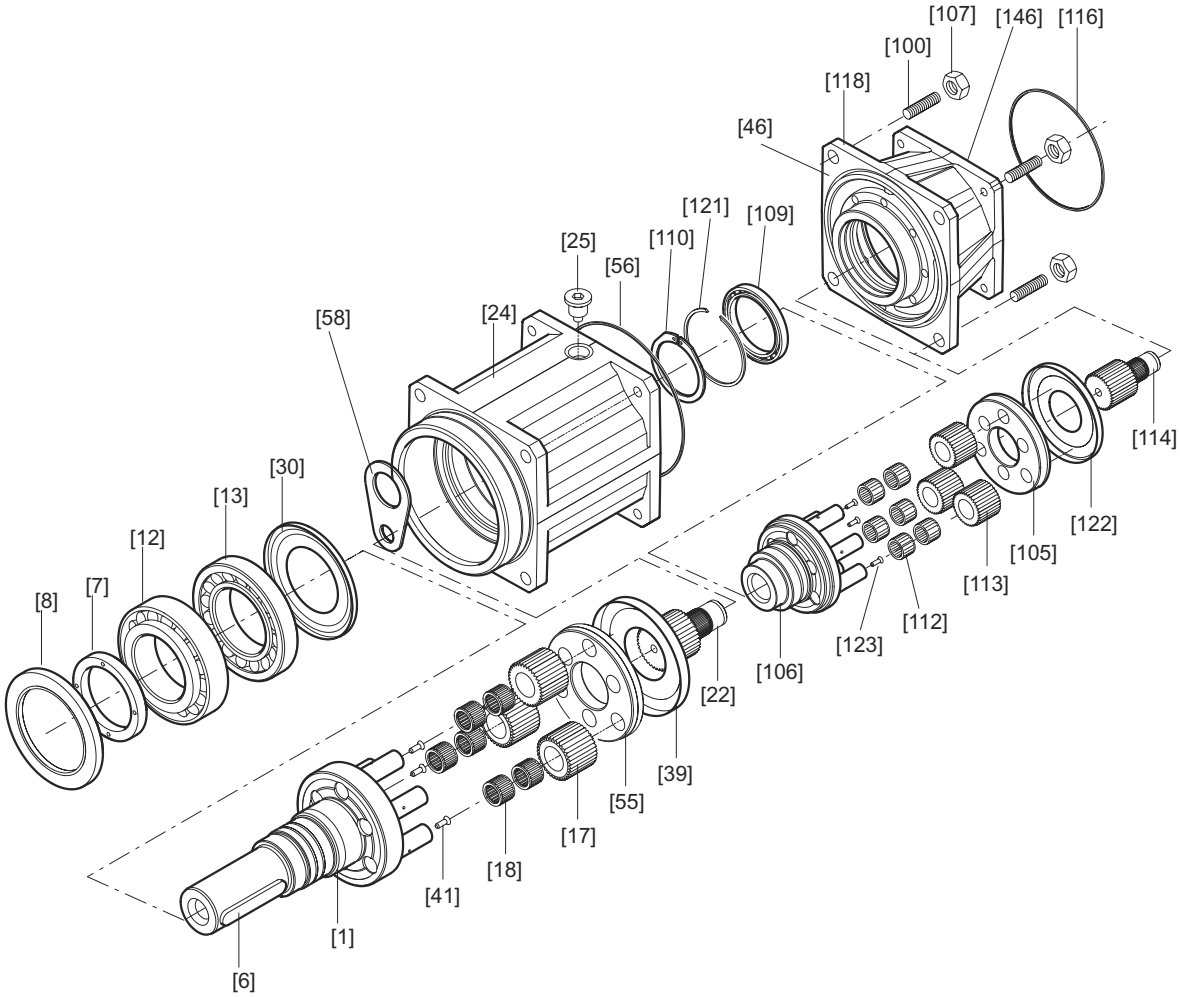

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Figure 7: Basic design of planetary servo gear units PSF122 / PSKF122 to PSF622 / PSKF622

[1]	Planet carrier for output, complete	[30]	Nilos ring[1)]	[109]	Grooved ball bearing
[6]	Key[2)]	[39]	Safety disk	[110]	Circlip
[7]	Shaft nut	[41]	Countersunk pin	[112]	Needle roller
[8]	Oil seal	[46]	Adhesive and sealing compound	[113]	Planet wheel
[12]	Tapered roller bearing	[55]	Thrust plate	[114]	Sun wheel
[13]	Tapered roller bearing	[56]	O-ring	[116]	O-ring
[17]	Planet wheel	[58]	Eyebolt[3)]	[118]	Housing preliminary stage
[18]	Needle roller	[100]	Stud	[121]	Spring ring
[22]	Sun wheel	[105]	Thrust plate	[122]	Safety disk
[24]	Housing	[106]	Planet carrier, complete	[123]	Countersunk pin
[25]	Screw plug	[107]	Hexagonal nut	[146]	Adhesive and sealing compound

1) Only for mounting position M2

2) Only for PSKF122 to PSKF622

3) Only for PSF622 / PSKF622

3.3.4 Basic design of a two-stage planetary servo gear unit

PSF722 / PSKF722 and PSF822 / PSKF822

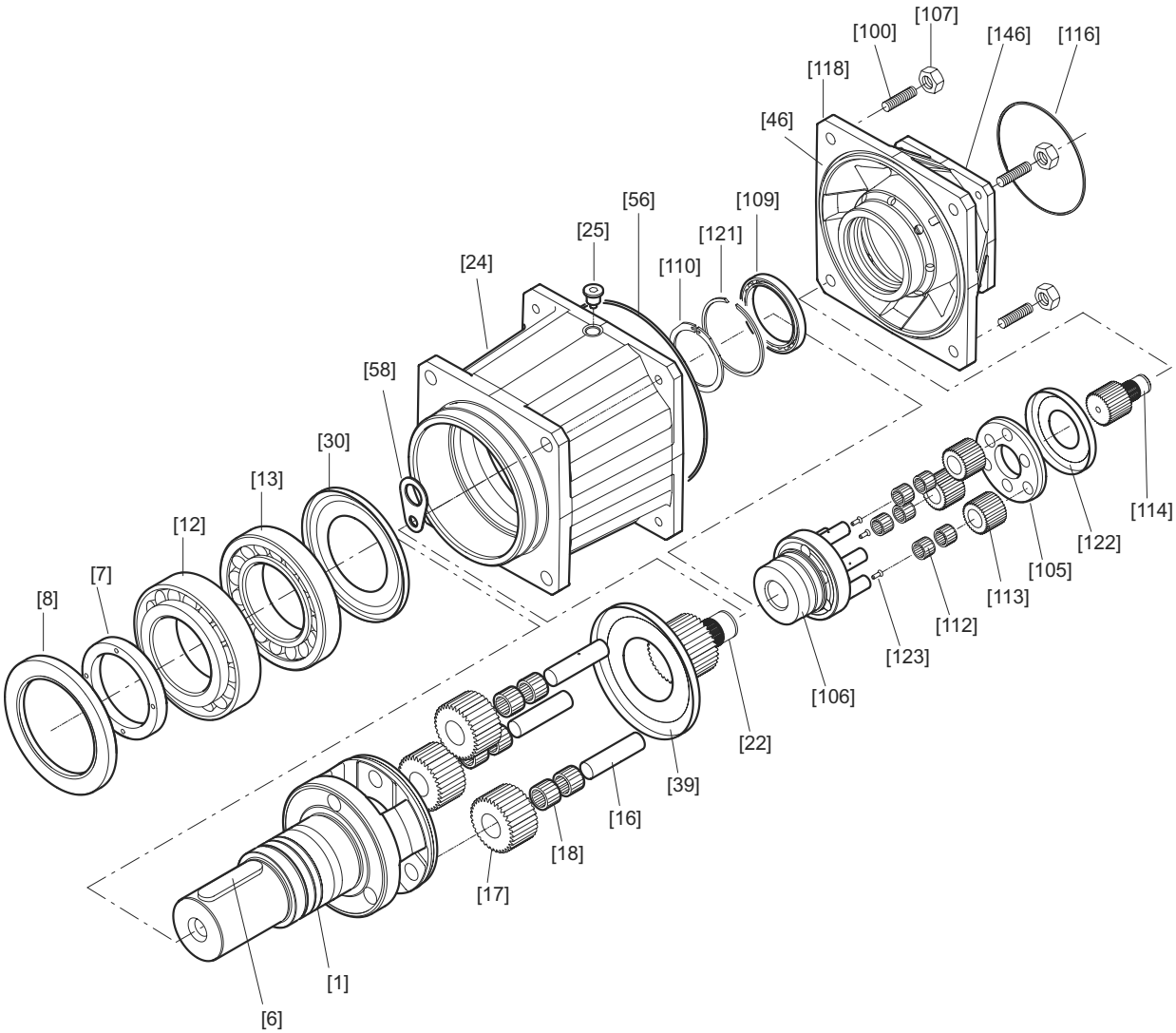

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Figure 8: Basic structure of planetary servo gear units PSF722 / PSKF722 and PSF822 / PSKF822

[1]	Planet carrier for output	[25]	Screw plug	[110]	Circlip
[6]	Key[1)]	[30]	Nilos ring[2)]	[112]	Needle roller
[7]	Shaft nut	[39]	Safety disk	[113]	Planet wheel
[8]	Oil seal	[46]	Adhesive and sealing compound	[114]	Sun wheel
[12]	Tapered roller bearing	[56]	O-ring	[116]	O-ring
[13]	Tapered roller bearing	[58]	Eyebolt	[118]	Housing preliminary stage
[16]	Planetary gear axle	[100]	Stud	[121]	Spring ring
[17]	Planet wheel	[105]	Thrust plate	[122]	Safety disk
[18]	Needle roller	[106]	Planet carrier, complete	[123]	Countersunk pin
[22]	Sun wheel	[107]	Hexagonal nut	[146]	Adhesive and sealing compound
[24]	Housing	[109]	Grooved ball bearing		

1) Only for PSKF722 and PSKF822

2) Only for mounting position M2

3.3.5 Basic design of a two-stage planetary servo gear unit

PSF922 / PSKF922

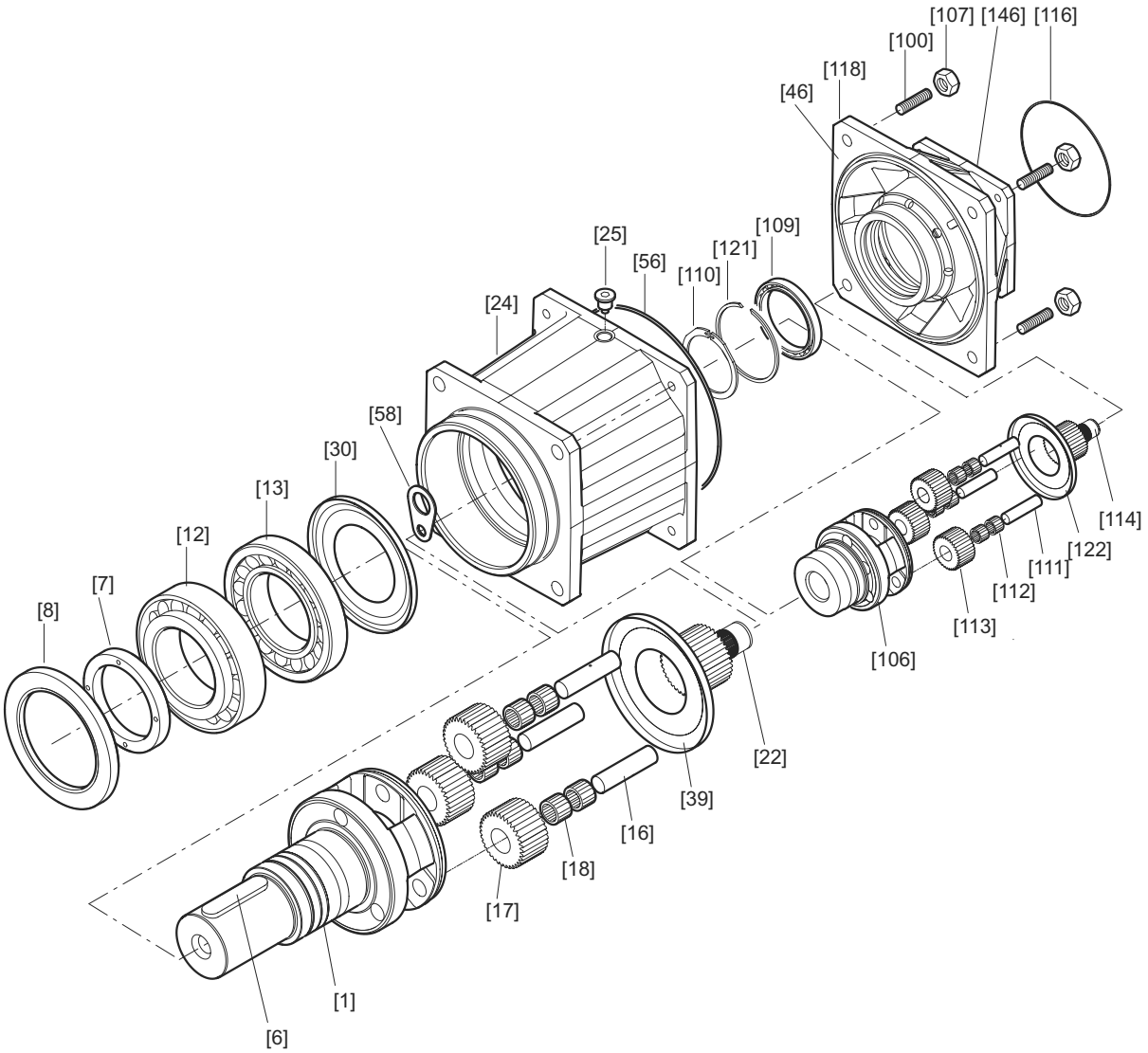

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Figure 9: Basic structure of planetary servo gear units PSF922 / PSKF922

[1]	Planet carrier for output	[25]	Screw plug	[110]	Circlip
[6]	Key[1)]	[30]	Nilos ring[2)]	[111]	Planetary gear axle
[7]	Shaft nut	[39]	Safety disk	[112]	Needle roller
[8]	Oil seal	[46]	Adhesive and sealing compound	[113]	Planet wheel
[12]	Tapered roller bearing	[56]	O-ring	[114]	Sun wheel
[13]	Tapered roller bearing	[58]	Eyebolt	[116]	O-ring
[16]	Planetary gear axle	[100]	Stud	[118]	Housing preliminary stage
[17]	Planet wheel	[105]	Thrust plate	[121]	Spring ring
[18]	Needle roller	[106]	Planet carrier	[122]	Safety disk
[22]	Sun wheel	[107]	Hexagonal nut	[123]	Countersunk pin
[24]	Housing	[109]	Grooved ball bearing	[146]	Adhesive and sealing compound

1) Only for PSKF922

2) Only for mounting position M2

3.3.6 Basic design of a single-stage planetary servo gear unit

PSBF221, PSBF321 to PSBF521, PSBF621 and PSBF821

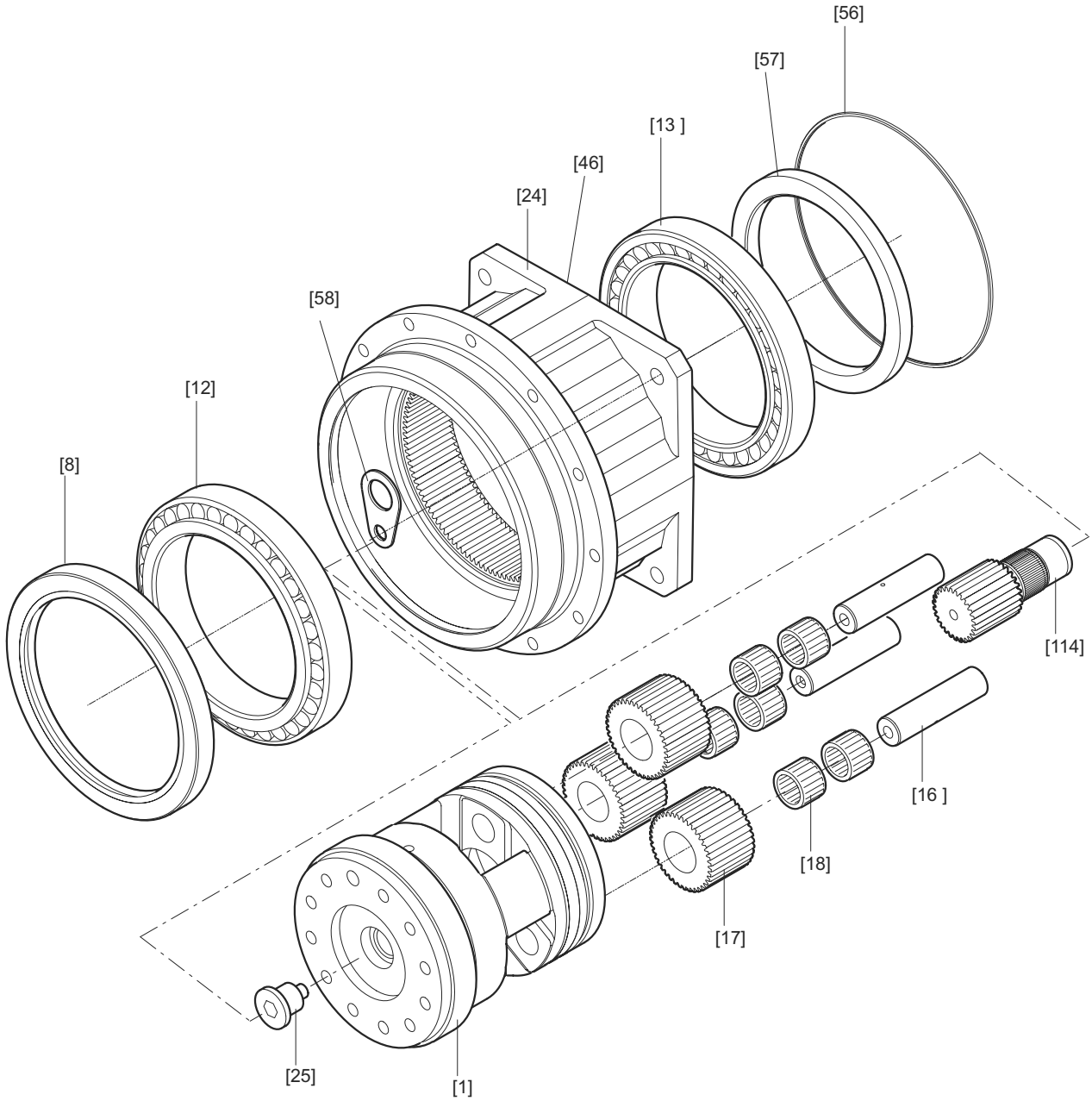

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Figure 10: Basic structure of servo planetary gear units PSBF221, PSBF321 to PSBF521, PSBF621 and PSBF821

[1]	Planet carrier for output	[16]	Planetary gear axle	[56]	O-ring
[8]	Oil seal	[17]	Planet wheel	[57]	Shaft nut
[12]	Angular contact ball bearing[1)]	[18]	Needle roller	[58]	Eyebolt [3]
[12]	Tapered roller bearing[2)]	[24]	Housing	[114]	Sun wheel
[13]	Angular contact ball bearing[2)]	[25]	Screw plug		
[13]	Tapered roller bearing[2)]	[46]	Adhesive and sealing compound		

1) Only for PSBF221

2) Only for PSBF321 to PSBF521, PSBF621 and PSBF821

3.3.7 Basic design of a two-stage planetary servo gear unit

PSBF222, PSBF322 to PSBF522, PSBF622 and PSBF822

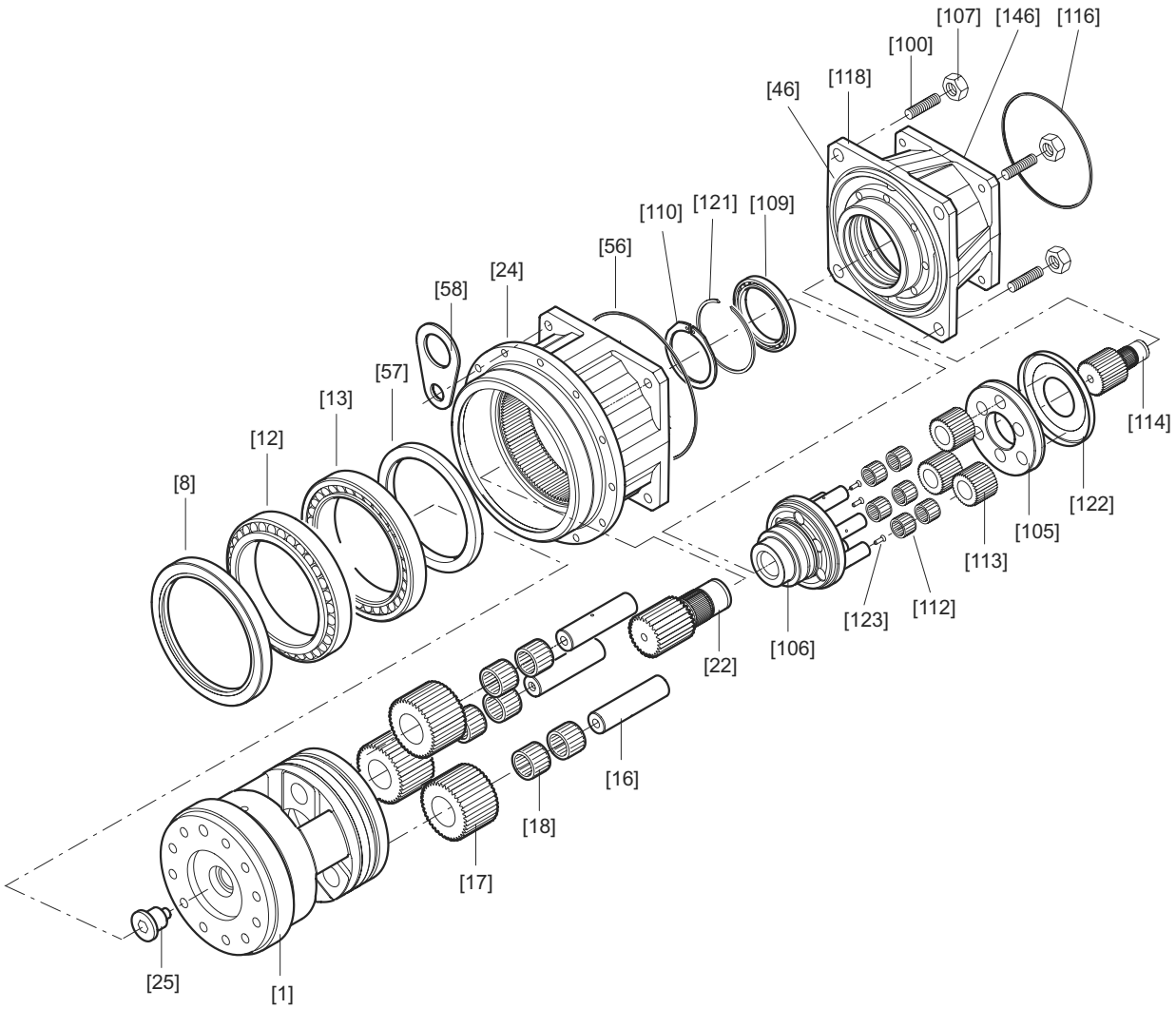

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Figure 11: Basic structure of servo planetary gear units PSBF222, PSBF322 to PSBF522, PSBF622 and PSBF822

[1]	Planet carrier for output	[25]	Screw plug	[112]	Needle roller
[8]	Oil seal	[46]	Adhesive and sealing compound	[113]	Planet wheel
[12]	Angular contact ball bearing[1)]	[56]	O-ring	[114]	Sun wheel
[12]	Tapered roller bearing[2)]	[57]	Shaft nut	[116]	O-ring
[13]	Angular contact ball bearing[1)]	[58]	Eyebolt[3)]	[118]	Housing preliminary stage
[13]	Tapered roller bearing[2)]	[100]	Stud	[121]	Spring ring
[16]	Planetary gear axle	[105]	Thrust plate	[122]	Safety disk
[17]	Planet wheel	[106]	Planet carrier, complete	[123]	Countersunk pin
[18]	Needle roller	[107]	Hexagonal nut	[146]	Adh. and sealing compound
[22]	Sun wheel	[109]	Grooved ball bearing		
[24]	Housing	[110]	Circlip		

1) Only for PSBF222

2) Only for PSBF322 to PSBF522, PSBF622 and PSBF822

3) Only for PSBF622 and PSBF822

3.3.8 Basic design of an adapter for planetary servo gear units

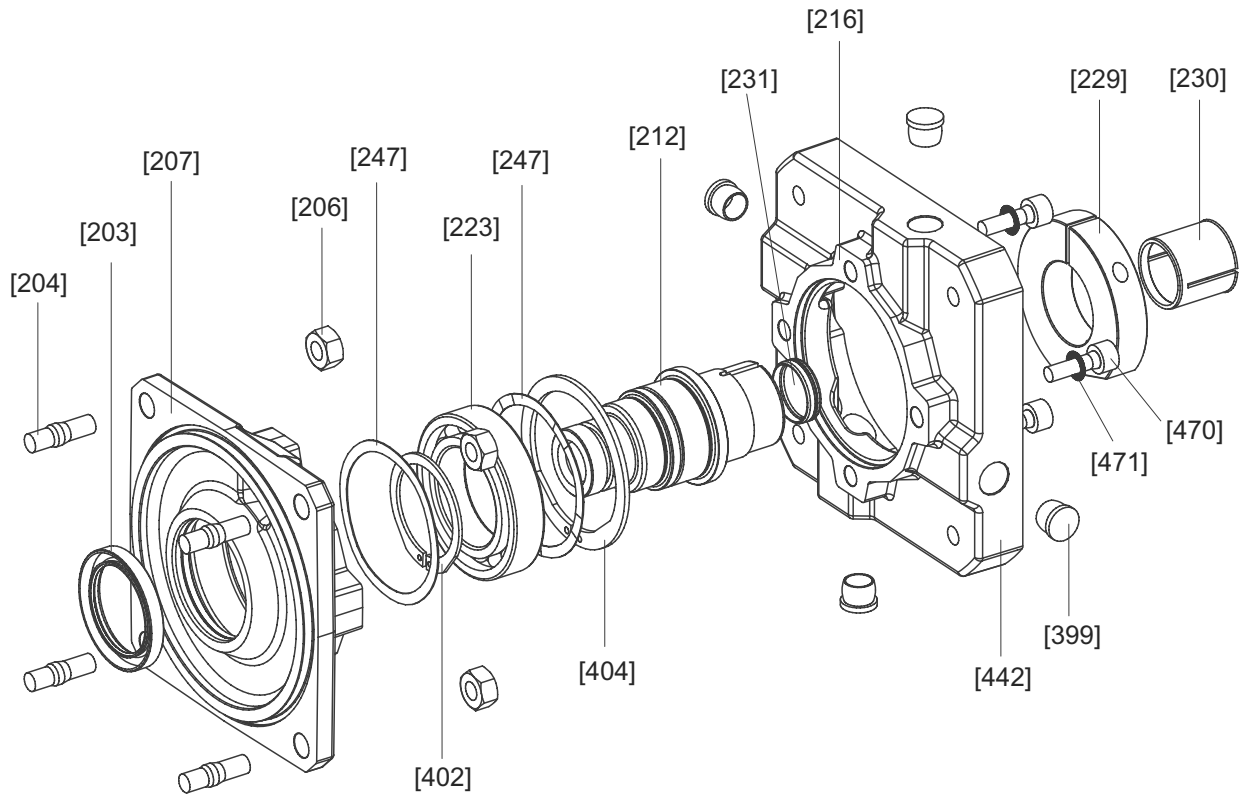

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Figure 12: Basic design of the adapter for planetary servo gear units

[203]	Oil seal	[223]	Grooved ball bearing	[402]	Circlip
[204]	Stud	[229]	Clamping ring	[404]	Circlip
[206]	Hexagonal nut	[230]	Coupling sleeve	[442]	Adapter flange
[207]	Flange	[231]	Closing cap	[470]	Machine screw
[212]	Adapter shaft	[247]	Equalizing ring	[471]	Washer
[216]	Adhesive and sealing compound	[399]	Closing plug		

4 Mechanical Installation

4.1 Before you start

The drive may only be installed if:

- The entries on the nameplate of the motor match the voltage supply system
- the drive is undamaged (no damage caused by transportation or storage)

4.2 Prerequisites for installation

- You must clean the output shafts and flange surfaces thoroughly to ensure they are free of anti-corrosion agents, contamination or similar. Use a commercially available solvent.

Possible material damages!

Do not let the solvent come into contact with the sealing lips of the oil seals!

- Do not assemble the drive without having ensured that there will be sufficient ventilation after installation to prevent heat build-up.

- When the drive is installed in abrasive ambient conditions, protect the output end oil seals against wear.

4.3 Required tools

- Set of wrenches
- Torque wrench + set of screwdrivers with long hexagon shaft
- Mounting device
- Shims and distance rings, if necessary
- Fixing devices for input and output elements

4.4 Installing the gear unit

The gear unit is only allowed to be installed in the specified mounting position on a level[1)] and torsionally rigid support structure. Otherwise, impermissibly high additional forces may occur that can cause the gear unit to fail prematurely. Vibrations from the environment must be avoided.

Always use **screws** of **quality 10.9** for mounting planetary servo gearmotors.

The drain screw must be easily accessible!

Use plastic inserts (2-3 mm thick) if there is a risk of electrochemical corrosion between the gear unit and the driven machine. The material used must have an electrical bleeder resistor < 10^9 Ω. Electrochemical corrosion can occur between various metals, for example, cast iron and high-grade steel. Also fit the bolts with plastic washers!

4.5 Installation in the machine

PSF.. planetary servo gear units Mounting at gear unit end via the B5 mounting flange

Mounting position M1:

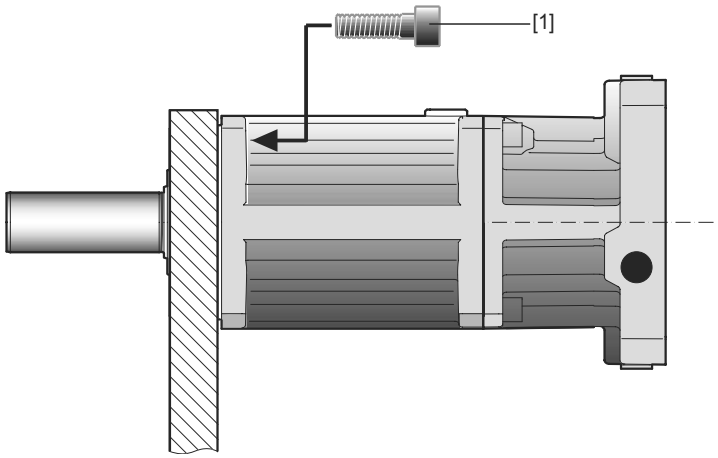

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Figure 13: Installing the PSF.. planetary servo gear unit in the machine

[1] Screws of quality 10.9

1) Maximum permitted deviation for flange attachment to DIN ISO 1101.

4.6 Mounting output elements on solid shafts

When mounting and removing output elements, ensure that the gear unit shaft and consequently the planetary servo gear unit is not damaged. Otherwise your right to claim under warranty against SEW-EURODRIVE GmbH & Co KG becomes invalid.

4.6.1 Assembly with key

The following figure shows a sample mounting device for installing couplings [3] or hubs onto motor or gear unit shaft ends. It may be possible to dispense with the thrust bearing [2] on the mounting device.

In the **PSF.. / PSKF.. series**, you can use the **shaft shoulder** (see position [1]) as a defined **stop when mounting input and output elements**.

The output shafts are coated with an **antirust agent** on delivery. **Remove** the antirust agent **before assembly**, e.g. using benzine.

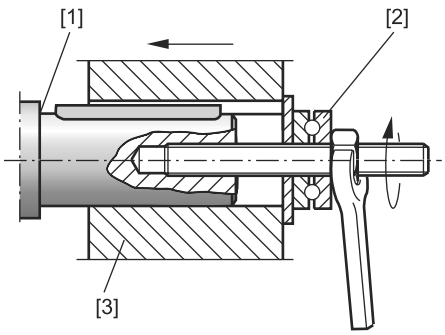

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Figure 14: Assembly with mounting device

[1] Shaft shoulder
[2] Thrust bearing
[3] Coupling hub

4.6.2 Assembly without key

The following figure is an example of shaft assembly with clamping set.

When using, for example, clamping sets with smooth shaft ends, ensure that the shaft is free from residue and that any grease is removed. It is essential to make sure that the **clamping area** [5] is **free from grease**. Otherwise the shaft/hub connection may not function properly.

To prevent corrosion on the shaft **grease** any uncovered areas [4] **after assembly**.

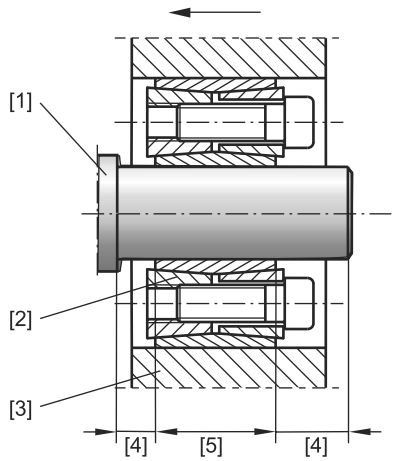

Figure 15: Assembly with clamping sets

[1] Shaft shoulder
[2] Clamping set
[3] Output element, e. g. gear or sprocket
[4] Greased shaft areas
[5] Ungreased clamping area

4.6.3 Avoiding impermissibly high overhung loads

The following illustration shows the correct mounting arrangement of a gear or chain sprocket for avoiding impermissibly high overhung loads.

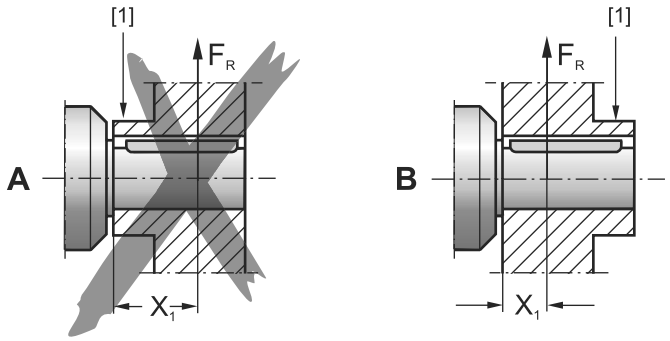

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Figure 16: Mounting arrangement of a gear or sprocket wheel

[1] Hub

Illustration A = Incorrect
Illustration B = Correct

4.6.4 Inner and outer centering rings for flange block gear units

The following illustration shows the correct mounting arrangement for a shaft connection with an inner and outer centering ring.

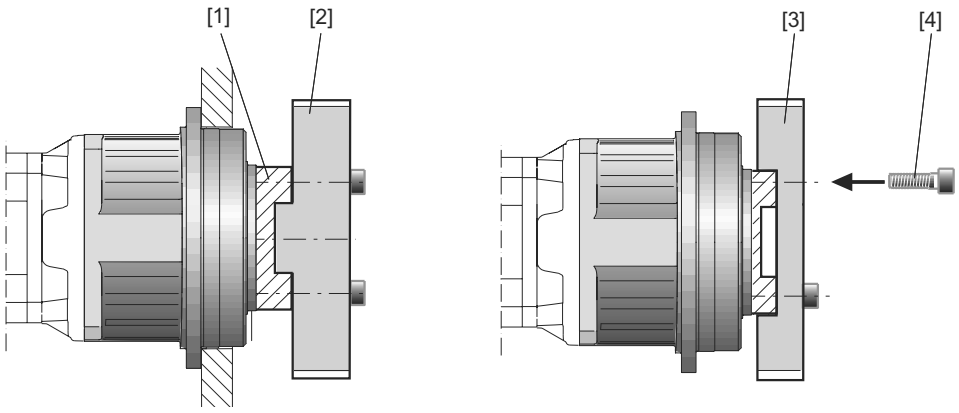

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Figure 17: Sample mounting for a PSBF.. flange block

[1] Flange block
[2] Gear / belt pulley with inner centering ring
[3] Gear / belt pulley with outer centering ring
[4] Screws of quality 12.9

4.6.5 Installation notes

Observe the following installation instructions:

- Only use a mounting device for installing input and output elements. Use the center bore and the thread on the shaft end for positioning.
- Never drive belt pulleys, couplings, pinions, etc. onto the shaft end by hitting them with a hammer as this can damage the bearings, housing and shaft.
- In the case of belt pulleys, make sure the belt is tensioned correctly in accordance with the manufacturer's instructions.
- Power transmission elements should be balanced after fitting and must not give rise to any impermissible radial or axial forces (see the Low-Backlash Geared Servomotor" catalog for permitted values).

Only use screws in strength class 12.9 to fasten the output elements onto the planetary servo gear unit; see the following table:

Machine screws with hexagon socket to DIN EN ISO 4762	Strength class	Tightening torque [Nm]
M4	12.9	5.1
M5	12.9	10
M6	12.9	18
M8	12.9	43
M10	12.9	84
M12	12.9	145

Mounting is easier if you heat the bore of the output element briefly to between 80 °C and 100 °C.

4.7 Installing couplings

Adjust the following misalignments according to the coupling manufacturer's specifications when mounting couplings:

A Maximum and minimum clearance

B Axial misalignment

C Angular misalignment

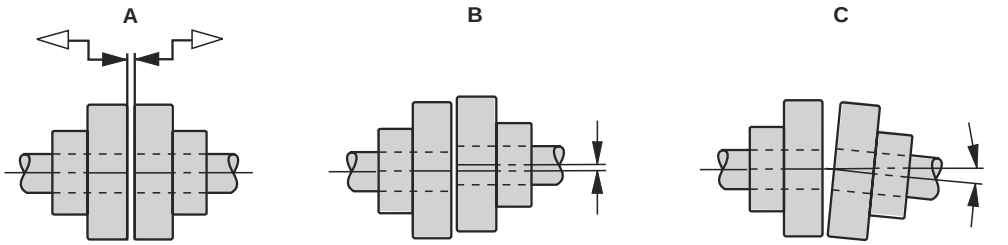

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Figure 18: Maximum and minimum clearance (A), axial misalignment (B), angular misalignment (C)

Caution! Risk of crushing and injury!

Input and output elements such as belt pulleys, couplings, etc. must be covered with a touch guard to prevent injuries.

4.8 Motor mounting with EPH.. adapter

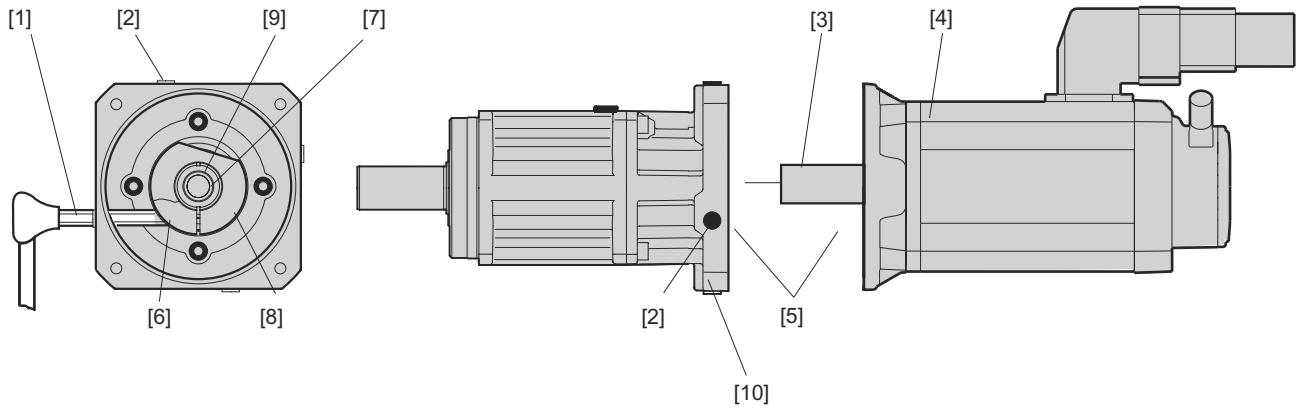


Figure 19: Motor mounting with EPH.. adapter

[1] Torque wrench
[2] Closing plug
[3] Motor shaft
[4] Motor
[5] Face
[6] Clamping screw
[7] Coupling sleeve
[8] Clamping ring with socket head screw
[9] Adapter shaft
[10] EPH adapter

When installing or removing the EPH.. adapter, take care not to tilt or jam the servomotor, otherwise the function for transferring the torque may not work properly.

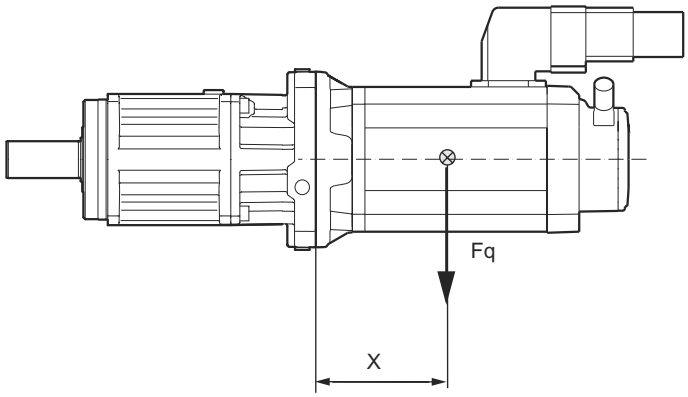
4.8.1 Installation sequence

Observe the following sequence for installation:

1. A motor [4] with a minimum rotational accuracy to DIN 42955 can be mounted in any position. Protect the encoder and other assemblies.
2. Check the plane surfaces [5] of the motor and adapter for scoring and smooth them if necessary.
3. Clean and degrease the hollow shaft bore in coupling [10] and motor shaft [3].
4. Remove one of the four closing plugs [2].
5. Turn the coupling [10] with the clamping ring [9] until the screw head of the clamping screw (7) is in alignment with the mounting hole in the built-on housing. Loosen the clamping screw [7].
   – For motors with a keyway: Turn the key by 90° to the slots in the adapter shaft. To compensate imbalance, we recommend inserting a half key in the keyway.
6. If using coupling sleeves [8], make sure that the slots in the coupling sleeve [8] are in alignment with the slots in the coupling [10] and clamping ring [9].
7. Carefully slide the gear unit onto the motor shaft [3].
8. Insert the connecting screws through the holes of the motor flange into the threads of the adapter flange and tighten them slightly.
9. Tighten the screws diagonally with even force.
10. Use a torque wrench [1] to tighten the clamping screw(s) [7] to the prescribed tightening torque.

Adapter type	Motor shaft diameter [mm]	Number of clamping screws	Tightening torque of clamping screws [Nm]	Wrench size
EPH01	≤ 11	1	10	4
EPH02	≤ 14	1	18	5
EPH03	≤ 14	1	18	5
EPH04	≤ 19	1	18	5
EPH05	≤ 24	1	43	6
EPH06	≤ 35	1	43	6
EPH07	≤ 32	1	43	6
EPH08	≤ 38	1	83	8
EPH09	≤ 42	1	83	8
EPH10	≤ 55	1	145	10

4.8.2 Maximum permitted weight of motors



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⊗ .. Motor's center of gravity

X .. Distance: adapter flange to middle of motor

Fq .. Overhung load

Gear unit type	Adapter type EPH	X [mm]	Fq [N][1)]
PSF..121 PSF..122 PSF..222	EPH01/01-03	100	120
	EPH02/04-11	120	150
PSF..221 PSF..322	EPH01/01-03	100	120
	EPH02/04-08	120	150
	EPH03/06-14	182	157
	EPH04/12-14	182	157
PSF..321 PSF..522	EPH04/03-14	182	157
	EPH05/14-20	290	273
PSF..521 PSF..622 PSF..722	EPH04/12-14	182	157
	EPH05/14-20	220	273
	EPH06/19	290	312
	EPH07/20-22	290	312
PSF..621 PSF..822	EPH05/14-20	220	273
	EPH06/19	290	312
	EPH07/20-22	290	312
	EPH08/22	351	600
PSF..721 PSF..922	EPH05/14-20	220	273
	EPH06/19	290	312
	EPH07/20-22	290	312
	EPH08/22	351	600
PSF..821	EPH09/22-24	400	680
	EPH10/24-25	400	680
PSF..921	EPH09/22-24	400	680
	EPH10/24-25	400	680

1) Maximum load values for connection screws of strength class 8.8. The maximum permitted weight of the attached motor F_{qmax} must be reduced proportionally as the distance between the adapter flange and the middle of the motor (x) increases. When this distance is reduced, F_{qmax} cannot be increased.

4.9 Removing the EPH.. adapter from the motor

If the customer removes the adapter from the planetary servo gear units, this can cause the unit to malfunction!

Never remove the EPH.. adapter from the PSF.. planetary gear unit yourself . If a customer removes the PSF.. planetary servo gear unit themselves, this can cause the unit to malfunction. In this case, the customer's right to claim on warranty is no longer valid.

4.9.1 Removing the EPH.. adapter from the motor

1. Switch off the drive
2. Secure the load
3. Turn off the power supply to the motor
4. Allow the drive to cool
5. Unscrew the clamping screws
6. Unscrew the connection screws between the motor and adapter
7. Remove the motor without tilting or jamming it

5 Startup

Check that the direction of rotation is correct in decoupled status. Listen out for unusual grinding noises as the shaft rotates.

Secure the keys for the test run without output elements. Do not deactivate monitoring and protection devices for the test run.

Switch off the gearmotor if in doubt whenever changes occur in relation to normal operation, e.g. noises or vibrations. Determine the cause of the fault and, if necessary, contact SEW-EURODRIVE.

Gear units with motor adapter

For gear units with an adapter, you must ensure that the data specified in the project planning documents for the gear unit is not exceeded. It is essential that the gear unit is not overloaded.

Inverter-operated gearmotors

The parameter settings made for the inverter must prevent the gear unit from being overloaded. Refer to the project planning documents for the correct gear unit data.

5.1 Special design feature for mounting position M2

With mounting position M2, it is important that you only operate the gear unit at a maximum of 50 % of the limit speed for the first 24 hours of operation.

5.2 Measuring surface and oil temperature

The nameplate data on maximum surface temperature is based on measurements at standard ambient conditions and installation altitudes. Even slight changes of these conditions, such as limited installation space, can have a tremendous impact on the temperature.

5.2.1 Measuring the surface temperature

It is absolutely necessary to measure the surface temperature at maximum load during startup of the gear unit. A commercially available thermometer is sufficient for this measurement.

Measure the surface temperature at the transition space between gear unit and adapter where the position of the terminal box prevents venting by the motor fan. The maximum surface temperature will be reached after approximately three hours and may not exceed a difference value of 70 K when compared with the ambient temperature.

Switch off the drive immediately if the temperature exceeds 70 K compared with the ambient temperature. Contact SEW-EURODRIVE in this case.

5.2.2 Measuring the oil temperature

The oil temperature must be measured to determine the lubricant change intervals stipulated in the section "Inspection and Maintenance." To do so, measure the temperature at the bottom of the gear unit. Add 10 K to the measured value. Use this temperature value to determine the lubricant change interval.

6 Inspection and Maintenance

6.1 Maintenance

The PSF.. planetary servo gear units are designed for high endurance when operated according to the designated use specified in the catalog. Wearing parts are an exception, for example, the bearings, oils seals for the specific application and the lubricant.

The maintenance work listed in the table below must be carried out for the PSF.. planetary servo gear units.

Time interval	What to do?
• Every 3000 machine hours, at least every 6 months	• Check running noise for possible bearing damage • Check the adapter visually for leakage • Check the seals visually for leakage If you notice a leakage, contact service.
• If required (depending on external factors)	• Touch up or renew the surface / anticorrosion coating
• Depending on the operating conditions, at the latest every 5 years	• Change synthetic oil • Touch up or renew the surface / anticorrosion coating
• After 25000 ... 30000 operating hours	• Renew the anti-friction bearing grease • Change the oil seal

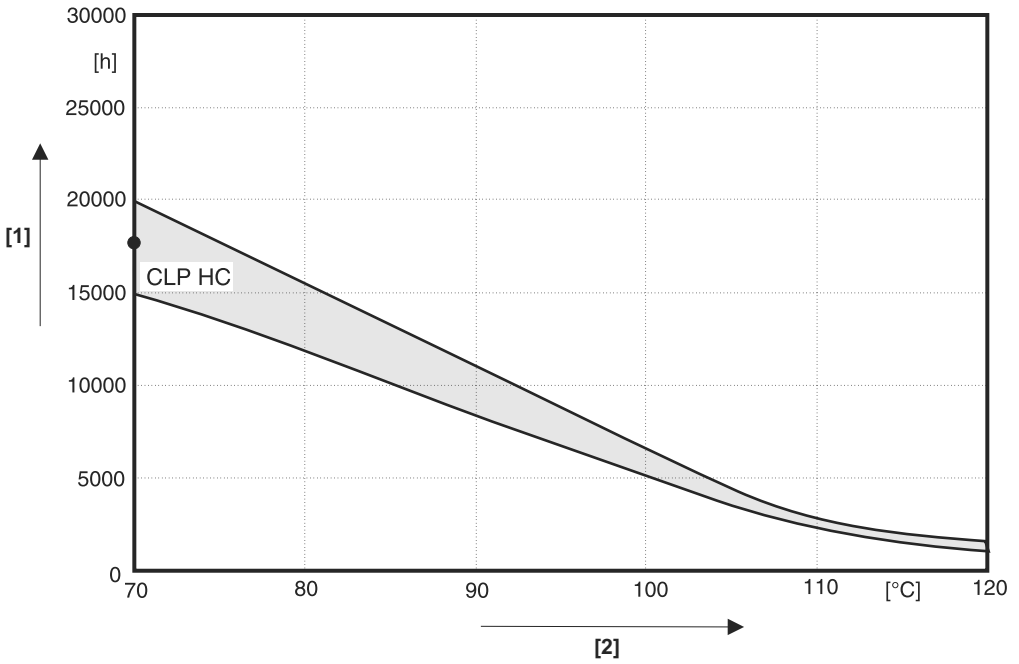
Mixing lubricants!

Do not mix the factory-filled lubricant with other lubricants.

6.2 Lubricant change intervals

PSF.. planetary servo gear units can be used in ambient temperatures between –20 °C and +40 °C.

The following table lists the lubricant change intervals for the above temperature range.



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[1] Operating hours

[2] Sustained oil bath temperature

- Average value per oil type at 70 °C

See chapter 8 for more information on lubricants.

6.2.1 Fill quantities dependent on mounting position

PSF.. planetary servo gear units	Adapter mounting - Fill quantity in liters [l]			Direct mounting Fill quantity in liters[l]		
Type	**M1 (M3, M5, M6)**	**M2**	**M4**	**M1 (M3, M5, M6)**	**M2**	**M4**
121	0.023	0.025	0.023	0.023	0.037	0.023
122	0.035	0.056	0.054	0.035	0.068	0.054
221	0.035	0.052	0.035	0.035	0.063	0.035
222	0.045	0.075	0.085	0.045	0.085	0.085
321	0.070	0.100	0.070	0.070	0.120	0.070
322	0.095	0.170	0.190	0.095	0.185	0.190
521	0.140	0.215	0.150	0.140	0.245 (0.270)*	0.150
522	0.200	0.360	0.395	0.200	0.380	0.395
621	0.300	0.465	0.320	0.300	0.500 (0.550)*	0.320
622	0.410	0.680	0.780	0.410	0.710	0.780
721	0.600	0.930	0.650	0.600	1.060	0.650
722	0.750	1.230	1.645	0.750	1.280	1.645
821	1.000	1.750	1.350	-	-	-
822	1.550	2.550	3.350	1.550	2.640	3.350
921	1.400	2.450	1.900	-	-	-
922	2.050	3.500	4.350	2.050	3.650	4.350

PSBF.. plan. servo gear units	Adapter mounting - Fill quantity in liters [l]			Direct mounting Fill quantity in liters [l]		
Type	**M1 (M3, M5, M6)**	**M2**	**M4**	**M1 (M3, M5, M6)**	**M2**	**M4**
221	0.025	0.040	0.025	0.025	0.051	0.025
222	0.035	0.061	0.060	0.035	0.074	0.060
321	0.050	0.073	0.055	0.050	0.090	0.055
322	0.075	0.140	0.135	0.075	0.150	0.135
521	0.100	0.150	0.110	0.100	0.175 (0.200)*	0.110
522	0.150	0.295	0.280	0.150	0.315	0.280
621	0.200	0.320	0.190	0.200	0.360 (0.410)*	0.190
622	0.300	0.540	0.500	0.300	0.570	0.500
821	0.600	1.100	0.800	-	-	-
822	1.100	1.900	2.100	1.100	2.000	2.100

*) *Fill quantities for direct mounting of CFM90 servomotors*

PSF.. and PSBF.. planetary servo gear units	Fill quantity tolerance in liters [l]
121/122	± 0.001
221/222	± 0.001
321/322	± 0.002
521/522	± 0.005
621/622	± 0.005
721/722	± 0.010
821/822	± 0.010
921/922	± 0.010

7 Malfunctions

7.1 Customer service

Please have the following information to hand if you require the assistance of our customer service:

- Nameplate data (complete)
- Type and extent of the problem
- Time the problem occurred and any accompanying circumstances
- Assumed cause

7.2 Faults and troubleshooting

Fault	Possible cause	Remedy
Unusual, irregular running noise	• Meshing / grinding noise: Bearing damage • Knocking noise: Irregularity in the gearing	• Contact customer service
	• Controller setting	• Check inverter parameters
Oil leaking	• Defect oil seal or pseudo-leakage[1)]	• Contact customer service
Lubricant leaks from adapter	• Defect oil seal or pseudo-leakage[1)]	• Contact customer service
Difference between surface temperature and ambient temperature >70 K	• Restricted air supply	• Ensure air supply is unrestricted and / or contact customer service
	• Speed/torque is too high	• Check the configuration and / or contact customer service

1) A temporary leakage caused by too much grease between the sealing lip and protective lip. The superfluous grease appears as a pseudo-leakage.

7.3 Send in for repair

Please contact the SEW-EURODRIVE service if a malfunction cannot be rectified.

Please provide the following information when sending the drive in for repair:

- Serial number (→ nameplate)
- Unit designation
- Digits of the service code
- Brief description of the application
- Connected motor (motor type, motor voltage, ⅄ or Δ circuit, rated speed)
- Nature of the error
- Accompanying circumstances
- Your own presumptions as to what has happened
- Any unusual events preceding the problem, etc.

8 Lubricants

8.1 General information

Unless a special arrangement is made, SEW-EURODRIVE supplies the gear units with a lubricant fill adapted for the specific mounting position. The decisive factor is the mounting position (M1...M6) specified when ordering the drive. The standard synthetic lubricant has a service life of approximately 5 years under normal operating conditions. When subject to increased stress, such as higher temperatures, the oil must be changed according to the lubrication intervals specified on page 37 .

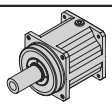
SEW-EURODRIVE fills the gear units with the amount of oil specified for the specific mounting positions. If the mounting position is changed, the amount of oil must be adapted as required. Consequently, a mounting position may only be changed after consultation with SEW-EURODRIVE, otherwise your right to claim under warranty no longer applies.

- The PSF.. planetary gear units from SEW-EURODRIVE are supplied exclusively with synthetic lubricants.

See section 6.2 for information on the lubricant change intervals.

The following lubricant table shows the permitted lubricants for PSF.. planetary servo gear units from SEW-EURODRIVE.

8.2 Lubricant table for gear unit oil

PSF..	Ambient temperature °C -20 0 +20 +40 +60	DIN ISO	ISO	Oil	Anti-friction bearing grease
	- 20 ... + 40	CLP PG 220[1)]	VG 220	Klübersynth GH6-220	Klüber Petamo GHY 133 N

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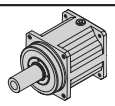
1) CLP PG = Polyglycol

8.3 Lubricant table for the food industry

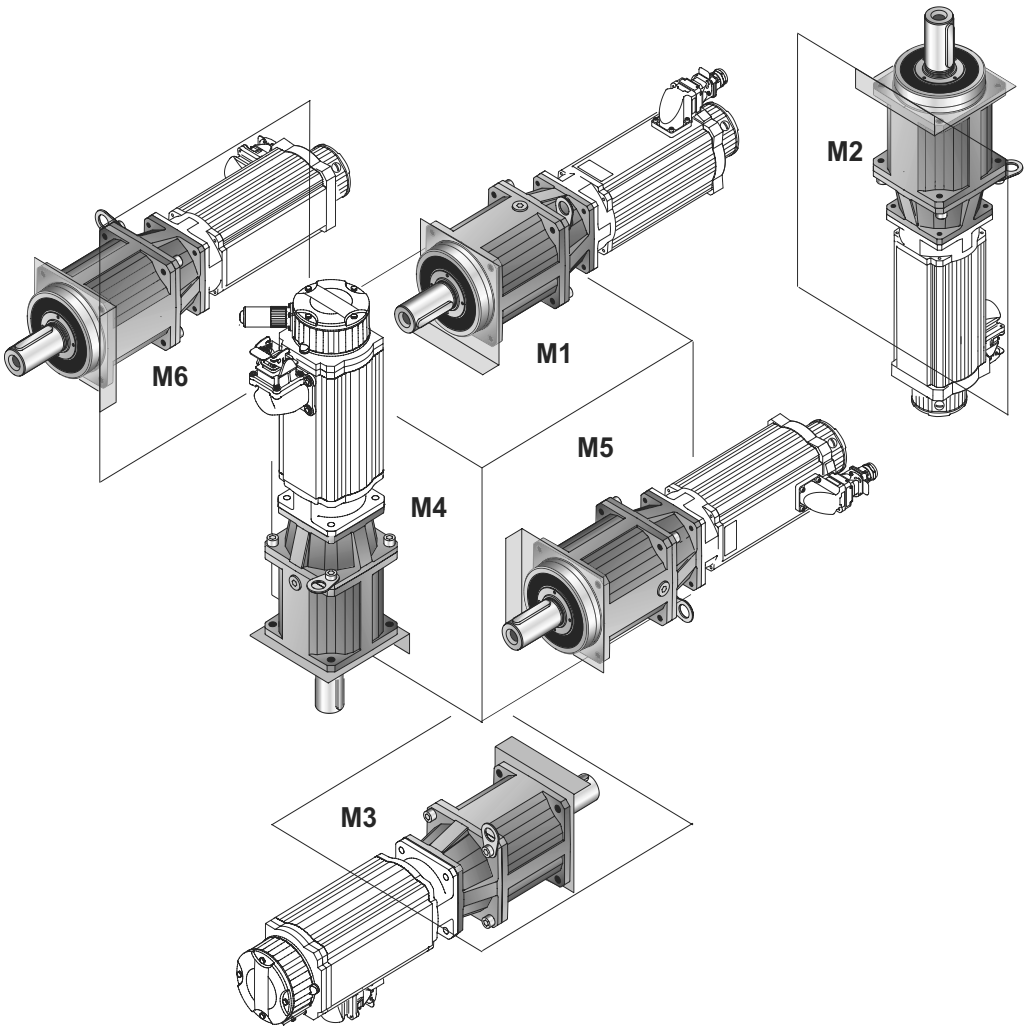
PSF..	Ambient temperature ° C -20 0 +20 +40 +60	ISO	Oil	Anti-friction bearing grease
	–20 +40	VG 460	Klübersynth UH1 6-460	Aral Eural Grease EP2

57980AEN

9 Mounting Positions

9.1 General information on mounting positions

In the case of planetary servo gear units, SEW-EURODRIVE distinguishes between mounting positions M1 to M6. The following figure shows the position of the gear unit in mounting positions M1 to M6.



53997AXX

Figure 20: Depiction of mounting positions M1 to M6 for the PSF.. planetary servo gear units

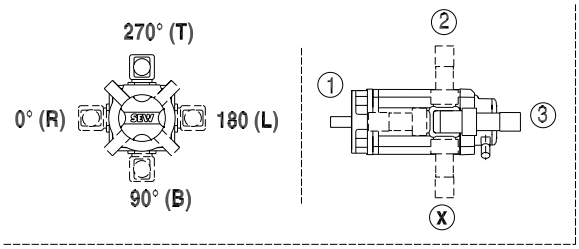
9.1.1 Symbols used

The following table shows the symbols used in the mounting position sheets and what they mean:

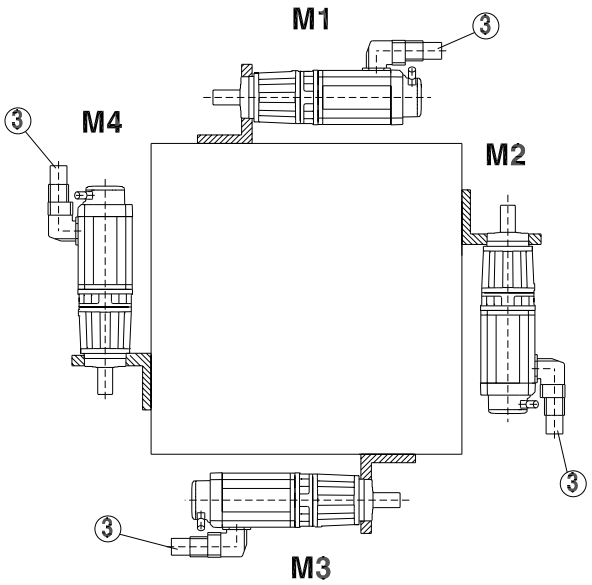
Symbol	Meaning
3	"Standard" cable entry position

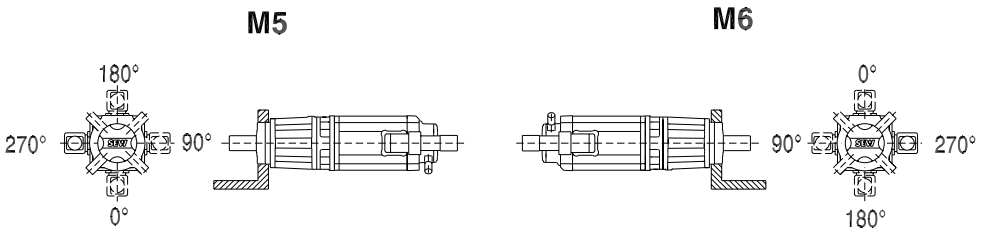
9.2 Mounting positions of planetary servo gearmotors

9.2.1 PSF112-912



58 001 00 03





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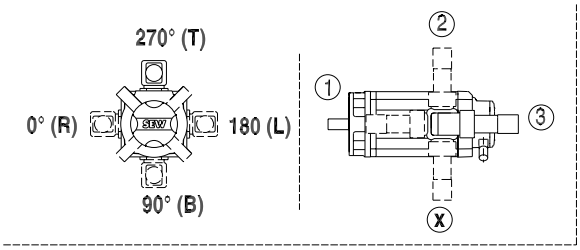
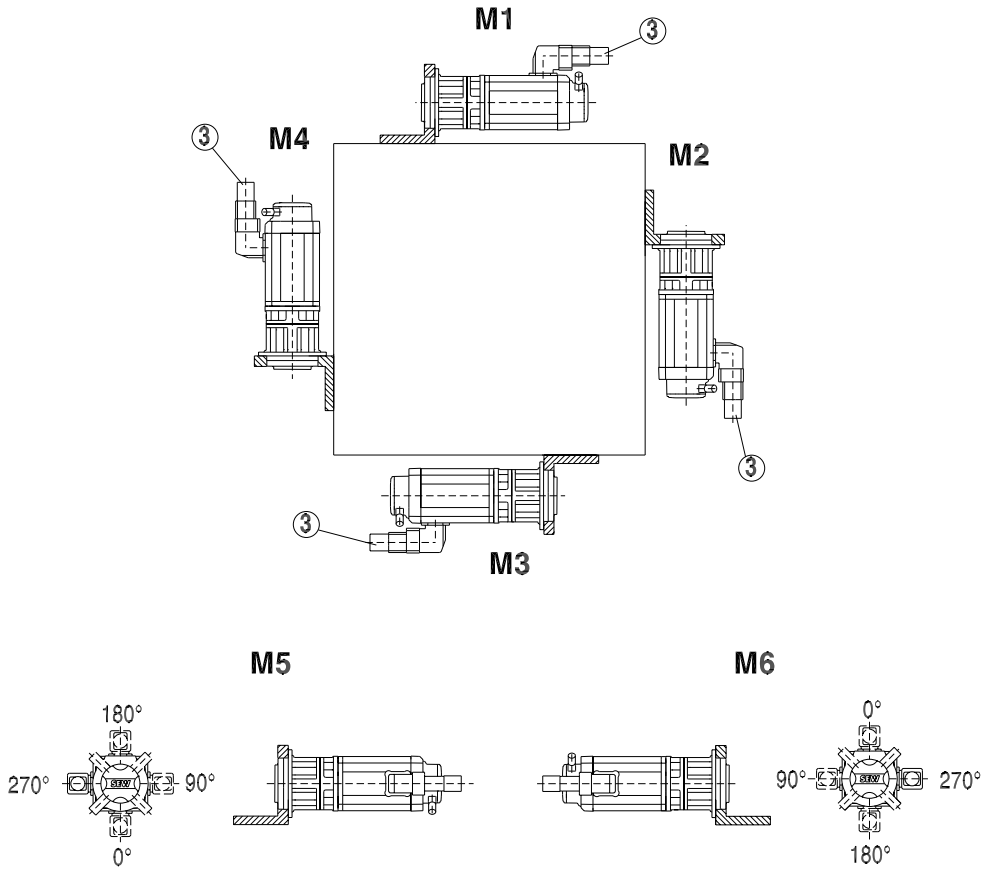
9.2.2 PSBF112-912



58 002 00 03



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10 Appendix

10.1 List of abbreviations

Abbreviation	Definition/ meaning
PSF..	Planetary servo gear unit [engl.: **P**lanetary **S**ervo **F**lange]
DIN	**D**eutsches **I**nstitut für **N**ormung e.V. (German institute for standardization)
EN	**E**uropäische **N**orm (European standard)
ISO	**I**nternational **O**rganization for **S**tandardization • The ISO creates ISO standards that should be adopted unrevised by the member states.
SW	**S**chlüssel**w**eite (Wrench size)

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	Drive Service Hotline / 24 Hour Service		+49 180 5 SEWHELP +49 180 5 7394357
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	Lyon	SEW-USOCOME Parc d'Affaires Roosevelt Rue Jacques Tati F-69120 Vaulx en Velin	Tel. +33 4 72 15 37 00 Fax +33 4 72 15 37 15
	Paris	SEW-USOCOME Zone industrielle 2, rue Denis Papin F-77390 Verneuil l'Etang	Tel. +33 1 64 42 40 80 Fax +33 1 64 42 40 88
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	Sydney	SEW-EURODRIVE PTY. LTD. 9, Sleigh Place, Wetherill Park New South Wales, 2164	Tel. +61 2 9725-9900 Fax +61 2 9725-9905 enquires@sew-eurodrive.com.au
	Townsville	SEW-EURODRIVE PTY. LTD. 12 Leyland Street Garbutt, QLD 4814	Tel. +61 7 4779 4333 Fax +61 7 4779 5333 enquires@sew-eurodrive.com.au

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	Additional addresses for service in Brazil provided on request!		

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	Vancouver	SEW-EURODRIVE CO. OF CANADA LTD. 7188 Honeyman Street Delta. B.C. V4G 1 E2	Tel. +1 604 946-5535 Fax +1 604 946-2513 b.wake@sew-eurodrive.ca
	Montreal	SEW-EURODRIVE CO. OF CANADA LTD. 2555 Rue Leger Street LaSalle, Quebec H8N 2V9	Tel. +1 514 367-1124 Fax +1 514 367-3677 a.peluso@sew-eurodrive.ca
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Estonia			
Sales	**Tallin**	ALAS-KUUL AS Mustamäe tee 24 EE-10620Tallin	Tel. +372 6593230 Fax +372 6593231 veiko.soots@alas-kuul.ee

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	Christchurch	SEW-EURODRIVE NEW ZEALAND LTD. 10 Settlers Crescent, Ferrymead Christchurch	Tel. +64 3 384-6251 Fax +64 3 384-6455 sales@sew-eurodrive.co.nz

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	Zilina	SEW-Eurodrive SK s.r.o. ul. Vojtecha Spanyola 33 SK-010 01 Zilina	Tel. +421 41 700 2513 Fax +421 41 700 2514 sew@sew-eurodrive.sk
	Banská Bystrica	SEW-Eurodrive SK s.r.o. Rudlovská cesta 85 SK-97411 Banská Bystrica	Tel. +421 48 414 6564 Fax +421 48 414 6566 sew@sew-eurodrive.sk

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South Africa			
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South Africa			
	Capetown	SEW-EURODRIVE (PROPRIETARY) LIMITED Rainbow Park Cnr. Racecourse & Omuramba Road Montague Gardens Cape Town P.O.Box 36556 Chempet 7442 Cape Town	Tel. +27 21 552-9820 Fax +27 21 552-9830 Telex 576 062 dswanepoel@sew.co.za
	Durban	SEW-EURODRIVE (PROPRIETARY) LIMITED 2 Monaceo Place Pinetown Durban P.O. Box 10433, Ashwood 3605	Tel. +27 31 700-3451 Fax +27 31 700-3847 dtait@sew.co.za

Spain			
Assembly **Sales** **Service**	**Bilbao**	SEW-EURODRIVE ESPAÑA, S.L. Parque Tecnológico, Edificio, 302 E-48170 Zamudio (Vizcaya)	Tel. +34 9 4431 84-70 Fax +34 9 4431 84-71 http://www.sew-eurodrive.es sew.spain@sew-eurodrive.es

Sweden			
Assembly **Sales** **Service**	**Jönköping**	SEW-EURODRIVE AB Gnejsvägen 6-8 S-55303 Jönköping Box 3100 S-55003 Jönköping	Tel. +46 36 3442-00 Fax +46 36 3442-80 http://www.sew-eurodrive.se info@sew-eurodrive.se

Switzerland			
Assembly **Sales** **Service**	**Basel**	Alfred Imhof A.G. Jurastrasse 10 CH-4142 Münchenstein bei Basel	Tel. +41 61 417 1717 Fax +41 61 417 1700 http://www.imhof-sew.ch info@imhof-sew.ch

Thailand			
Assembly **Sales** **Service**	**Chon Buri**	SEW-EURODRIVE (Thailand) Ltd. Bangpakong Industrial Park 2 700/456, Moo.7, Tambol Donhuaroh Muang District Chon Buri 20000	Tel. +66 38 454281 Fax +66 38 454288 sewthailand@sew-eurodrive.com

Tunisia			
Sales	**Tunis**	T. M.S. Technic Marketing Service 7, rue Ibn EI Heithem Z.I. SMMT 2014 Mégrine Erriadh	Tel. +216 1 4340-64 + 1 4320-29 Fax +216 1 4329-76 tms@tms.com.tn

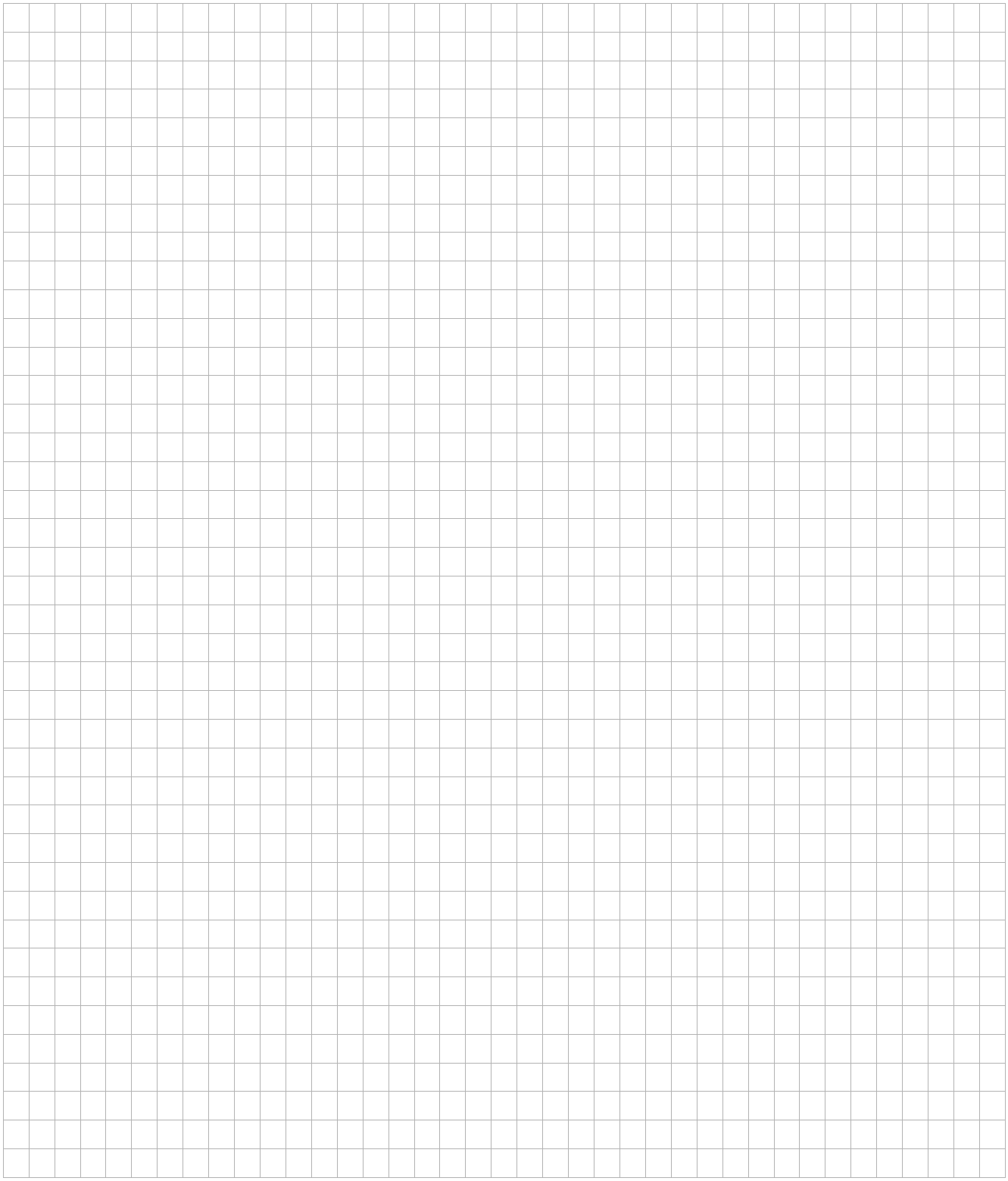
Turkey			
Assembly **Sales** **Service**	**Istanbul**	SEW-EURODRIVE Hareket Sistemleri San. ve Tic. Ltd. Sti. Bagdat Cad. Koruma Cikmazi No. 3 TR-34846 Maltepe ISTANBUL	Tel. +90 216 4419163 / 164 3838014/15 Fax +90 216 3055867 sew@sew-eurodrive.com.tr

Ukraine			
Sales **Service**	**Dnepropetrovsk**	SEW-EURODRIVE Str. Rabochaja 23-B, Office 409 49008 Dnepropetrovsk	Tel. +380 56 370 3211 Fax +380 56 372 2078 http://www.sew-eurodrive.ua sew@sew-eurodrive.ua

USA			
Production **Assembly** **Sales** **Service**	**Greenville**	SEW-EURODRIVE INC. 1295 Old Spartanburg Highway P.O. Box 518 Lyman, S.C. 29365	Tel. +1 864 439-7537 Fax Sales +1 864 439-7830 Fax Manuf. +1 864 439-9948 Fax Ass. +1 864 439-0566 Telex 805 550 http://www.seweurodrive.com cslyman@seweurodrive.com

USA			
Assembly **Sales** **Service**	**San Francisco**	SEW-EURODRIVE INC. 30599 San Antonio St. Hayward, California 94544-7101	Tel. +1 510 487-3560 Fax +1 510 487-6381 cshayward@seweurodrive.com
	Philadelphia/PA	SEW-EURODRIVE INC. Pureland Ind. Complex 2107 High Hill Road, P.O. Box 481 Bridgeport, New Jersey 08014	Tel. +1 856 467-2277 Fax +1 856 845-3179 csbridgeport@seweurodrive.com
	Dayton	SEW-EURODRIVE INC. 2001 West Main Street Troy, Ohio 45373	Tel. +1 937 335-0036 Fax +1 937 440-3799 cstroy@seweurodrive.com
	Dallas	SEW-EURODRIVE INC. 3950 Platinum Way Dallas, Texas 75237	Tel. +1 214 330-4824 Fax +1 214 330-4724 csdallas@seweurodrive.com
	Additional addresses for service in the USA provided on request!		

Venezuela			
Assembly **Sales** **Service**	**Valencia**	SEW-EURODRIVE Venezuela S.A. Av. Norte Sur No. 3, Galpon 84-319 Zona Industrial Municipal Norte Valencia, Estado Carabobo	Tel. +58 241 832-9804 Fax +58 241 838-6275 http://www.sew-eurodrive.com.ve sewventas@cantv.net sewfinanzas@cantv.net



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